Engin. Library

JAN 5 1942

FOOD INDUSTRIES

● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

IT'S HERE!
...WE MUST NOT
LOSE MORE
PRECIOUS TIME

(*SEE PAGE 35*)

JANUARY 1942

Preference Ratings Are Your Job

Watch the Water Supply

New Polyphase Quick Freezer

What's Known About The Dehydration Of Vegetables

Laboratory To Develop New Foods

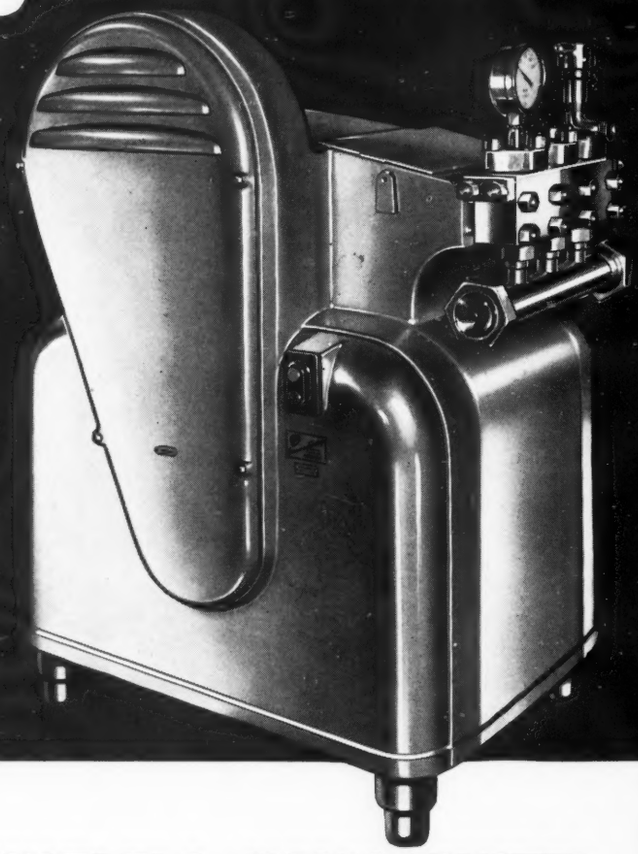
Control of pH In Canning

A McGRAW-HILL PUBLICATION

GIVES US BETTER BREAKUP AND DISPERSION

CUT OUR POWER COST NEARLY 35%

IT'S SANITARY AND EASY TO CLEAN



MULTI-FLO HOMOGENIZER

. . . A Distinct Advance in Homogenization Efficiency

The CP Multi-Flo is not just another homogenizer. Installations from coast-to-coast prove that it accomplishes a better job with less pressure. Write today for full details on the unique CP Single-Service Multi-Flo Valve . . . the new head construction that cuts disassembling time 50%; plus many other CP design advantages.

THE CREAMERY PACKAGE MFG. COMPANY

General Offices: 1249 W. WASHINGTON BLVD., CHICAGO, ILL.

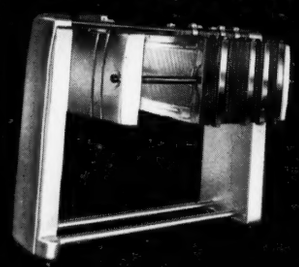
Branches in 18 Principal Cities

THE CREAMERY PACKAGE MFG. CO., LTD., London, England

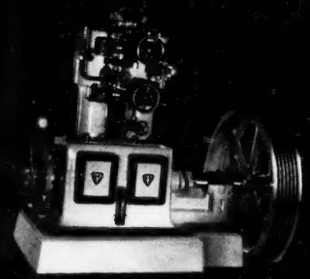
CREAMERY PACKAGE MFG. CO. OF CANADA, LTD., Toronto, Canada

OTHER CP EQUIPMENT

that may fit your needs—



CP Full-Flo Plate Heat Exchange Equipment
Bulletin . . . E-5



CP Refrigerating Machinery
Bulletin . . . V-99

CP Roto-Seal Centrifugal Pumps
Bulletin . . . H-691

CP Multi-Process Tanks
Bulletin . . . B-571

JANUARY FOOD TECHNOLOGY

FOOD TECHNOLOGY
Determining Color of Wine..... 99

MEATS
Palatability of Beef..... 99
Determining Firmness of Fatty Tissues... 99

VITAMINS
Carotene from Alfalfa..... 99
Ascorbic Acid Content of Red Raspberries. 100

ENGINEERING
Designs Own Machines To Speed Production 55
Polyphase Freezer Developed; Low-Cost Unit Built..... 62
Doubles Refrigerating Capacity by Draining Ammonia Lines..... 64
Mechanical System Proves Efficient for Refrigerating Trucks..... 70

QUALITY CONTROL
Watch Your Water Supply—It Affects Food Quality..... 47

SUGAR
Gluconic Acid from Glucose..... 100

BAKING AND MILLING
Wheat Rust and Baking Quality..... 101

DAIRY PRODUCTS
Delayed Salting of Brick Cheese..... 101
Use of Concentrated Skim Milk Foam.... 101
Rancidity of Homogenized Milk..... 101
Research Laboratory to Develop New Foods on Pilot-Plant Scale..... 50

CANNING AND PRESERVING
Control of pH in Canning Acid Products.. 52
How To Sulphur Fruit for Great Britain.. 61
What's Known Today About Dehydrating Vegetables 57

MISCELLANEOUS
Fruit Properties of Red Apples..... 102

THE COVER

Time has become the most vital element in America's war-production schedule. Not only must we become the arsenal and the larder of the Allies, but we must do it quickly. As stated on the cover of this issue, "It's Here—We Must Not Lose More Precious Time." And one of the things that must be done to gain time in making the United States the larder for nations fighting the Axis is the establishment in Washington of a central planning committee for the food preservation industries. We may have to feed 70,000,000 people in addition to our own civilians and soldiers—a total of 200,000,000. This imperative problem is analyzed in an editorial on page 35.

FOOD INDUSTRIES

M. A. WILLIAMSON, *Publisher*
E. S. STATELER, *Associate Editor, Chicago*
F. K. LAWLER, *Managing Editor*
ELIZABETH B. SHAW, *Assistant Editor*
S. T. Henry, Spruce Pine, N. C.
Earle Mauldin, Atlanta, Ga.

LAURENCE V. BURTON, *Editor*
G. L. MONTGOMERY, *Associate Editor*
R. W. DISPENNETT, *Assistant Editor*
R. S. McBride, Washington, D. C.
Paul Wooton, Washington, D. C.
N. A. Bowers, San Francisco, Cal.

VOL. 14 NO. 1

JANUARY, 1942

PREFERENCE RATINGS ARE YOUR JOB..... 39

SPECIAL FEATURE

Pictures of Processes..... 66

QUALITY CONTROL

Watch Your Water Supply—It Affects Food Quality
By K. G. Weckel 47

Research Laboratory To Develop New Foods on Pilot Plant Scale.....*By F. L. Seymour-Jones* 50

Control of pH in Canning Acid Products
By C. T. Townsend and M. J. Powers 52

PRODUCTION

Designs Own Machines To Speed Production
By Mandus E. Bridston 55

What's Known Today About Dehydrating Vegetables
By W. V. Cruess and E. M. Mrak 57

How To Sulphur Fruit for Great Britain..... 61

ENGINEERING

Polyphase Freezer Developed; Low-Cost Unit Built
By Luis H. Bartlett and W. R. Woolrich 62

Doubles Refrigerating Capacity by Draining Ammonia Lines.....*By E. G. Applegate* 64

MATERIALS

What OEM Says About Tin Supplies..... 68

Directory of Whole-Egg Driers..... 69

MANAGEMENT

Mechanical System Proves Efficient for Refrigerating Trucks 70

EVERY MONTH

We are Losing Precious Time.... 35
Talk of the Industry..... 36
Automotive 70
The Food Industry News..... 73
Men, Jobs and Companies..... 87
New Packages and Products..... 91
Food Equipment News..... 92
Catalogs 96
Food Technology—Abstracts 99
Books 103
Patents 104
Formulas 107

This Issue

Your Most Difficult Problem

Exiled in Egypt, the Children of Israel once made bricks without straw. Many food processors think their position more difficult today, faced as they are with the necessity of increasing production, but at a loss as to how to get needed equipment and supplies. Priorities and allocations have seemed to some an insurmountable barrier to increased production.

However, that is far from true. W. B. Spooner, Jr., has studied this matter for a number of clients since priorities first began. He has ferreted out the best ways of obtaining the highest possible legitimate preference ratings. Page 39.

Product Development Perks Up

Locating a laboratory in the head office, so that the development of new food products can be carried out with the direct cooperation of the heads of sales and production departments is something unusual. And when such a laboratory, equipped with a wide variety of pilot plant equipment, is situated on an upper story of a New York skyscraper, it is even more unusual.

Such a product development laboratory was opened by The Borden Co. last month. Why it was built, its functions and equipment, are described on page 50 by Dr. F. L. Seymour-Jones, who planned the laboratory and is now its director.

Water Can Do Funny Things

Color, flavor, odor and purity of food products all depend upon the quality of water, whether it enters into the food as an ingredient, or is merely used for cleaning and washing purposes. Also, the efficiency of plant services, such as boilers and condensers, is affected by the scaling qualities of available water supplies.

Food manufacturers had best watch their water supplies. Dr. K. G. Weckel, Wisconsin University, an authority on water for food plants, tells what to watch for on page 47.

All About Vegetable Drying

Vegetable drying gives promise of developing into greater importance under the impetus of war-time food demands and restrictions on container materials. All of which attaches special importance to information on how to dry vegetables. And nowhere are you likely to find a more complete coverage of dehydration methods than in the series of articles "What's Known Today About Dehydrating Vegetables," starting on page 57. The authors are W. V. Cruess and E. M. Mrak, of the University of California.

Coming

You Can Learn From Cheese

Out of bitter experience the cheese industry has learned valuable lessons about plant sanitation and its effect on the quality of the product. And these lessons are of such a nature that other food industries can profit from them.

How to "sanitize" equipment by the use of chlorine solutions, how to keep flies out of the plant and how to avoid mold troubles are things the cheese makers have learned how to do—things every food manufacturer must know to be a success.

This story will be told by J. C. Marquardt, technologist at the New York State Agricultural Experiment Station, Geneva, N. Y.

Mold Control by Experts

Each year the baking industry loses 100 million loaves of bread because mold makes them unsalable, an authority estimates. Which gives you an idea of the seriousness of the mold problem in the bakery. And out of the experience of this industry in the use of mold and rope inhibitors comes some worthwhile information for the other food industries.

This information will be contained in an article by Elmer F. Glabe, chief chemist, food research division, Stein Hall Manufacturing Co., Chicago.

How Meat Shrinks

All meat packers are troubled with the shrinkage of meat and do what they can to reduce this loss. But a problem can be attacked more successfully when the underlying factors are known.

Therefore, the research carried out at the University of Minnesota under the auspices of the Hormel Research Foundation, on the why and how of meat shrinkage, is a real service to the food industries. Read what Dr. Wilfried Heller of the University of Minnesota tells about this research in FOOD INDUSTRIES for February.

More "Plant Trips" Coming

Progressive operators in any industry are continuously getting ideas on how to do things more efficiently from factories in other fields. There are few industries in America, to take an example, that have not taken a page out of the production book of the automobile manufacturers. Because of this opportunity to profitably borrow ideas and adapt them to one's own operation, FOOD INDUSTRIES will publish more "picture flow sheets" in coming issues. These will show you how things are done in the various food industries.

McGraw-Hill Publishing Company, Inc., James H. McGraw, Founder and Honorary Chairman. Publication Office: 99-129 North Broadway, Albany, N. Y., Editorial and Executive Offices: 330 West 42nd Street, New York.

Branch Offices: 520 North Michigan Ave., Chicago; 68 Post St., San Francisco; Aldwych House, Aldwych, London, W.C. 2; Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Atlanta, Ga.

JAMES H. McGRAW, Jr., President; HOWARD EHRLICH, Executive Vice-President; MASON BRITTON, Vice-Chairman; B. R. PUTNAM, Treasurer; DONALD C. McGRAW, Secretary and J. E. BLACKBURN, Jr., Director of Circulation.

A McGRAW-HILL PUBLICATION

Published monthly; price 35c a copy. Allow at least ten days for a change of address. All communications about subscriptions should be addressed to the Director of Circulation, 330 West 42nd Street, New York, N. Y. Subscription rates: United States and possessions, Mexico, Central and South American countries, $3 a year, $4 for two years, $5 for three years. Canada, $3.50 a year; $5 for two years; $6 for three years (payable in Canadian or U. S. funds). Great Britain and British possessions, 30 shillings for one year, 60 shillings for three years. All other countries, $5 a year, $10 for three years. Entered as second-class matter Aug. 17, 1936, at Post Office, Albany, N. Y., under the act of March 3, 1879. Cable address: "McGrawhill, N. Y." Member of A.B.P. Member of A.B.C. Contents indexed monthly in the Industrial Arts Index. Copyright, 1942 by McGraw-Hill Publishing Company, Inc.

FOOD INDUSTRIES

FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

LAURENCE V. BURTON, Editor JANUARY, 1942

We are Losing Precious Time

PRECIOUS months have been lost, and each passing day since the war has begun in earnest is as precious as a month of time before the attack on us began. As the days go by without adequate centralized planning for food preservation the time will surely come when we will be required to adopt extemporized emergency measures. It will then be found that the emergency methods should have been the object of lengthy prior study. It will then be found that to accomplish the emergency methods of food preservation there should have been previously carried out a series of preparatory steps. It may then, alas, develop that the plans and the preparatory steps cannot be taken until too late to save a crop.

70 Million More To Feed

Under Lease-Lend arrangements the United States has undertaken to supply to Great Britain all the perishable protein and "protective" foods it needs. That part of our obligation augments the food demand on our existing facilities by an estimated 20,000,000 persons.

On top of that is the common-sense conclusion that the United States must provision Russia in 1942—if it is possible to effect deliveries. That would add another estimated demand, equivalent to perhaps 50,000,000 persons. It makes a grand total of about 200,000,000 persons, one-third of whom live outside the United States and to whom we must expect to send the most valuable and the most perishable of our foods—the protein and "protective" foods.

Events occurring after December 7, 1941, should prove conclusively to any thinking, informed person that we are facing problems of a character and magnitude that few have envisioned. Their magnitude extends even to the humble food processing industry. OPM moves in the field of subsistence have, up to mid-December, been predicated on the existence or the continuation of the status quo in the Pacific and the Atlantic. OPM has appointed a series of single industry committees to advise it on matters of procurement. Unhappily these committees are not organized for food production and processing planning. And the status quo seems to be somewhat changed.

Planning is the vital, yet neglected, function. This country is facing an unknown future with vast outside commitments without alternative plans for the preservation of its perishable foods. Read anything you want to read between the lines of the preceding sentence—you are hardly likely to overstate the gravity of the situation. For military reasons it is well to abstain from a detailed estimate of the situation in print.

Who Is Planning?—Who, Indeed?

The several single-industry committees are excellent for administrative purposes—but where is the plan to administer? Who in Washington has surveyed the impending problems and knows exactly the conditions we may have to meet? Who in Washington has begun to prepare a comprehensive plan for coping with these problems? Who indeed? Nobody, unless it might be SMA, as far as I can ascertain.

It is to be hoped that Donald M. Nelson or Claude R. Wickard, or somebody of even higher authority, will initiate the action that is so imperatively needed. Otherwise food for Britain, for Russia and perhaps for ourselves in 1943 may be too little and too late.

L V Burton

EDITOR

The Talk of the Industry

● Germany, it has been unofficially reported, has about 800 multiplate quick freezing machines of Birdseye design, and has been freezing about 1,000,000,000 lb. of perishable foods per year. This is one way in which the Nazis minimized the use of tin and steel in food preservation. If the figures are correct, the Germans are considerably in advance of the United States in volume of quick freezing.

Aid from a Critic

Recent promulgation of a definition and standard of identity of margarine has not made the butter producers any happier. Judging by the earnestness of the dairy pleas, their margarine competition must be amazingly vigorous.

Paul McNutt, Federal Security Administrator, tried to comfort the butter folks with the thought that margarine will not be manufactured more easily or more economically as a result of the new standard of identity. Indeed, it seems likely that even more precise quality control will be needed. But butter manufacturers have protested loudly and frequently since this new standard was announced.

Result: Much free publicity for margarine. One wonders who is benefiting most from the controversy.

● One of the government's new periodicals, *Defense*, crows about: "Army buys, loads, ships 75 tons in less than a day's time."

That's nothing. In the last war, on two hours' notice, this "department"

had to organize and administer the feeding of a shipload of men, number unknown at the time but estimated to be 7,000. Later when the men were counted upon debarkation, the actual number was something over 5,000. The real achievement was, however, not in feeding the multitude on short notice but in staying out of jail afterward.

Phoney "Information Please"

At a certain convention last year there was a big luncheon, the main attraction of which was an "Information Please" program. A panel of so-called experts answered a flock of questions that had relatively little interest. Afterwards we discovered that the "experts" had asked these questions of themselves. More important, however, we learned that only one, single, bonafide question was sent in. The bonafide question was too hot to handle and the entire panel ducked it.

Later in the year at another convention an important feature was a similar program. This time the questions were not all self-asked, but it is odd that the so-called experts worked on the answers and rehearsed the show for a week prior to the convention.

The first case prompts us to say that anyone who knows all the answers is probably replying to unimportant or self-asked questions; the second case reminds one of a carefully prepared extemporaneous speech.

"Thanking You in Advance"

No phrase conveys less conviction of gratitude than "Thanking you in advance." And certainly it betrays a misunderstanding of the magnitude of the request, for no one renders thanks in advance except for a favor requested. No one would ever ask a passer-by to help him change a tire on his car with a "Hi, Buddy, give us a lift here, will yah? Thanks in advance."

If it is out of place in the spoken word, it is also out of place in correspondence. It robs the inquiry of all its zest. If anyone would imagine himself in the place of the person who is to receive the letter and realize that a minimum of fifteen minutes is going to be consumed by its handling, he would never send his "thanks in advance."

The time to acknowledge the gratitude for a favor is afterwards, never before. Give the other fellow a chance to believe that maybe—somehow—by a miracle—this inquiry comes from some one who is truly interested and appreciative. Never convince him in advance that his optimism is unwarranted.

● A playful salesman impersonated the representative of Office of Price Administration assigned to the Chemical Industries Exposition when he was out for lunch and gave "the works" to a very serious and troubled unidentified manufacturer who never

realized the hoax, informing him among other things that he would have to provide OPA with a list of his personal assets every 30 days. The manufacturer listened first with amazement, then with growing anger, finally told the impersonator that the OPA could go to hell and stormed out in what is technically termed "high dudgeon." What action OPA may take toward the employer of the impersonator is a matter of interesting conjecture.

Ways to Save On Fire Insurance

Companies with plants located outside of city limits or other places where adequate fire protection is lacking must pay a rate for fire insurance that is commensurate with the risk involved. Some such concerns put in sprinkler systems which will pay for themselves in a relatively few years, but, of course, such a form of protection requires a water tank large enough and high enough to satisfy the insurance companies. And these tanks on high towers cost real money.

Another way of providing a form of fire protection has been observed in a country plant in Delaware. When

a nearby village outgrew its old motorized combination chemical engine, hose cart and pumper, the food manufacturer purchased it for a small sum, and trained watchmen to operate it. Once a week the boys parade the Red Devil around the grounds and pump a little water just to see that all is well. The net result is a reduction in fire insurance costs that makes the fire engine almost pay for itself each year.

Only drawback to duplicating the stunt is to find a town that has outgrown its old fire-fighting equipment.

War

War is here—a tremendous war—a long war—a war that will strain every resource we possess—a war where the only alternatives are victory or extinction.

This is no time for flag waving. Emotional outlets are for those who don't know what to do.

Away with fact-blindness, lack of foresight, irresolution and stupidity!

We are embarked on a grim business. We are gearing every activity of this nation to the business of slaughtering misguided human beings who are bent on slaughtering us—a horrible job that we hate with our very souls.

It may not fall to our lot to press the trigger, to pull the lanyard, to bash in skulls or sink enemy ships, but it is the duty of the industry to carry on in spite of every obstacle, every impediment and every lack of what we have been accustomed to utilizing.

The duty of the food industry is to feed the nation adequately, also to feed its armed forces and have plenty left over in a form suitable for shipping to those who are allied with us in our endeavor to restore world sanity.

To many short-sighted persons this task appears easy—even simple. It will be only if we are victorious within one year. But it is conceded by all belligerents that this is to be a long war. Japan expects it to last ten years! Therefore you must plan your future food production strategy for two, three or even four years ahead.

Foresee and prepare for the problems that can or will develop under this or that contingency. Above all, don't lie down on the job merely because you can't get this or that. Your business will continue or close up depending on your resourcefulness, your resolution. You may have to revert to primitive methods to continue in existence. If you can't make one food, then make another. If you can't make any food, then convert your factory to some other business that is also a defense industry.

This is war—ruthless war! Carry on!

Adopt the Payroll Allotment Plan

Management should set up in every plant and office the payroll allotment plan of sale of defense bonds to all employees. We, the people of a free country, are the only ones who can supply the billions of dollars needed to keep up the defense of our nation. There is nobody else but we ourselves who must produce the money.

The nation needs cash, vast sums of cash—not once but continuously throughout the war. We must provide it. And we might as well realize it now that any surplus cash we may have cannot long be used to purchase consumer goods other than necessities because the goods won't be there. Such surplus cash should be invested in government defense bonds.

Treasury officials have developed a payroll allotment plan, now in use by many firms both large and small. Management should write for the plan and install it in every plant and office. Total war means that everybody is in it and everybody must help as much as he can.

What Can I Do?

Reprints of the analysis by James H. McGraw, Jr., (insert between pages 34 and 35) in answer to the question, "What Can I Do?" are available for the asking. In reprint form, the last section pledging the resources of McGraw-Hill will be omitted.—The Editors.

Hors d'Oeuvres

• The Nazis are quick freezing a billion pounds of food a year, and the Russians are quick freezing a million Nazis.

• *The alcoholic beverage industry fears the Drys will use "trailer women" as an argument against Repeal. A panzer attack?*

• In building Scalloway Castle in the Shetland Islands in 1600, the Earl Patrick Stewart mixed eggs with the mortar. Must have made it of stunco.

• *The FTC has charged a company in Brooklyn, N. Y., with misrepresenting the therapeutic efficacy of a medicinal wine, "Kalwaryjskie Wino Lecznicze." To pronounce it you start to sneeze twice, hold it, then let her blow.*

• National Dunking Association has requested the F&DA to define the difference between a doughnut and a cruller. May we suggest: "A doughnut is a hole wrapped in dough, while a cruller is dough wrapped in a hole." Or: "A cruller is a doughnut that got tired of chasing its tail."

• *The "forgotten" eggplant, says the New York State Department of Agriculture and Markets, contains phosphorus, some iron, a fair amount of vitamins A and B, and is valuable as a bulk product. That "bulk" quality really will be appreciated if food prices don't stop doing a Romeo for the balcony.*

• Ice cream consumption in 1941 was 10.61 quarts per capita in the United States, the highest on record. Yes, 1941 came almost to being a good year.

• *They say a mechanized army marches on its stomach. That is, it has to have its stomach full to hold its panzers up.*

• Indiana canners suggest that the new battleship "Indiana" be christened with tomato juice rather than champagne. But if symbolism means anything it would be far better to smash a jug of the potent Hoosier corn likker over her prow.

• *Peanut oil has been used by Germany as fuel for diesel engines in submarines. Here's one food we hope won't win the war.*

• Eggs of crawfish laid 1,000 years ago and found 15 ft. deep in Siberia's region of eternal frost have been hatched by Soviet scientists. And for nearly six months Hitler has been trying to hatch the egg laid by Napoleon in Russia 150 years ago.

• *Florida's orange industry is said to have been founded accidentally. Spanish explorers, eating the golden fruit they brought with them from Spain, spit out the seeds and these grew into America's first orange trees. No wonder oranges are rich in vitamins.*

• Information please! What's a *Scomber scombrus Linnacus*? If you can answer that you're an ichthyologist. If you can't, there's hope for you. It's a Boston mackerel.

• A *"Foods-of-the-Month Club" is being organized. The idea is to supply members with the latest commercial cuisine creations, a la the Book-of-the-Month Club. Why didn't somebody think of that before?*

• By radio from Nairobi, Kenya Colony, Africa, came a request to *Food Industries* last month for information about an extract for making cottonseed oil taste like olive oil so it could be fed to Italian prisoners of war. Personally, we'd feed them castor oil.

F. K. L.

George R. Webber

When George R. Webber of Standard Brands, Inc., died on November 1, 1941, the food industry lost one of its pioneer developers of better protective packages. Immediately before his death at the age of 51 he had been elected president of the Packaging Institute. His interest in packaging lay largely in the technical side. How to protect a food adequately at the lowest possible cost was his objective. Merchandising aspects and artistic design he left to those in the advertising profession. Today, when substitutions for familiar protective materials are the order of the day, his passing will prove to be a serious loss.

Sulphur Dioxide Preservation

One byproduct of the Lease-Lend Law is a growing awareness in the United States of certain notable differences between our own food laws and those of Great Britain. For instance, Britain permits the importation and remanufacture of fruits preserved by sulphur dioxide in a manner which has not been permitted in the United States. As a result SMA Lease-Lend orders for sulphured barreled fruits has found U. S. producers quite unprepared, and it has been necessary to provide detailed instructions for processors.

Because of the war in the Pacific and all the problems it may entail, it is advisable for the entire food industry to have readily available as much detailed information as possible about alternative methods of food preservation. There is no foretelling when it may come in handy. You will find it elsewhere in this issue.

Sick Pay Does Not Count

The wage-hour law administrator merely enforces instructions as passed by Congress. He has ruled that "payment to an employee at his hourly rate of pay for hours not worked does not constitute payment for overtime compensation and may not, therefore, be credited against overtime compensation under the act." This means that continuation of wages to an employee who is absent because of illness does not count at all. If, afterward, he should work overtime he must be paid at the overtime rate.

One should not cuss out the administrator of the wage and hour law, who previously happened to be General P. B. Fleming, but should reserve his brickbats for the members of Congress who enacted the law.

It is very doubtful if Congress ever foresaw such an interpretation. Its evil effect is to curtail any generous impulses on the part of employers, especially if the business is not going very well.

It's Your Move

The following quotation from the address by William S. Knudsen, before the National Manufacturers Association, serves to underline and emphasize an admonition that has appeared from time to time in these pages.

"Shortage and priorities didn't mean so much a year ago. Every company should analyze its business to determine the production that is not essential, and look around and **see if there isn't something else they can make to help out when shortages occur.**"

This applies to the food processing industries just as much as it does to the metal-working industries.

Steel—In a Nutshell

Steel making, like nearly all other metallurgical industries, is a continuous process industry, operating 24 hours a day. Broadly speaking, the capacity of the steel industry has been adjusted to the peace-time needs of the nation, most of which is an 8-hour-a-day demand. Now that defense and war needs have stepped up demand for steel and other metals to nearly a 24-hour-a-day demand, it is easy to see why production is insufficient to take care of every need. A three-shift industry geared to supply one-shift industries is unable to meet their needs when operating three shifts. Plainly, more steel making capacity is needed unless we, as a nation, are perfectly willing to submit to rationing.

Li—Fo Cost Accounting

"Li—Fo" means last in—first out. It applies to costing and accounting methods, and is highly important in periods of rapidly changing prices.

When utilized, it keeps cost figures closely in line with current affairs. Also, it keeps the profit margin in line with current costs. And, in turn, it tends to minimize the corporate income tax assessment. On the other hand, its opposite, first in—first out, shows the maximum of paper or speculative profits and bases costs on prior purchases of materials and supplies.

Large companies with extensive accounting staffs usually know all about it, and their production department is only indirectly concerned. But in smaller enterprises this principle of saving may escape proper attention. Be sure that your inventory and cost clerks enter their charge accordingly. Also be sure that top management and your legal advisers are in agreement on its utilization. Reason: U. S. Treasury officials would prefer to see maximum profits so that these could be taxed.

A further value of "Li—Fo" inventory accounting is that organized labor, seeking an excuse for a wage strike, is not offered a paper profit figure that is fictitious.

Unreasoned Restrictions

In the metal foil situation there is evidence of what one could term an unrealistic attitude in Washington. In the case of aluminum foil, OPM and OPA fail to distinguish clearly between decoration and technical utility.

Not long ago certain food uses for aluminum foil, such as yeast wrapping, were prohibited, but tin foil was permitted as a substitute! This, in the face of the fact that tin is an imported metal. Also, that one ton of aluminum foil is the equivalent of about two tons of tin foil. Furthermore, that there is no escaping the indispensable character of tin.

More recently, orders have been issued to further limit the use of foils made from tin, aluminum and also lead. OPA comes in at this point, for its price ceiling on lead prevents the operation of the highest cost producers, thus curtailing lead output. And still more recently the OPM orders were suspended for 30 days.

Prohibition of the use of metal foils for decoration is in line with the needs of the day, but where technical reasons exist for the use of foils, the matter deserves more searching inquiry before enforcing such drastic prohibitions. Which is not to shed crocodile tears over the disappearance of decorative uses of foils during the emergency.

The new Social Security Building in Washington, D. C., the main headquarters for the OPM.

PREFERENCE RATINGS ARE YOUR JOB!

By W. B. SPOONER, JR.

Spooner & Kriegel, Industrial Counsel, New York.

Whether you like it or not, preference ratings are up to you. Go after them no matter how much you dislike the job. If a single manufacturer breaks "the chain" of rating certificates or orders, it will cause trouble and delay to all his suppliers. Careful investigation of the status of all your orders will likely turn up priority advantages you did not know existed. What to look for and how to make the most of your findings are told in this article.

THERE is considerable uncertainty among food processors and manufacturers, as well as the suppliers of equipment and materials for their operations, as to the working of the present priorities system. Perhaps this is understandable, since no very extensive effort has been made to explain the workings of the system on a broad basis. Those who have taken the initiative and consulted the convenient OPM offices in their localities have been given prompt and effective assistance in solving their problems in connection with preference ratings, but far too many companies have not attempted to get the facts. Instead, they have assumed that their particular line of business put them ouside the pale and have done little or nothing to get the priorities to which they are actually entitled.

It seems logical to point out here that the function of the OPM is not to *prevent* anyone from doing business. Rather its purpose is to expedite business in face of nation-wide shortages of essential materials. The fact that its first job must be to insure the production of essential defense equipment and supplies should not obscure the equally important fact that, as far as humanly possible, the OPM is anxious to help you keep going, even if you have no connection with essential war work.

But here is the first point where you should avoid jumping to conclusions. We have heard many food manufacturers say "O well, we aren't making cheese or dried eggs. That's where they get the green light. We aren't connected with defense at all." Or, "How do I know where my stuff goes? I can't show that it goes into war work!"

And yet a relatively little bit of work on their part might show a very direct connection with war work. The point is that preference ratings are the job of the manufacturer. No one hands them to anyone on a silver platter. They are usually there—but they have to be gone after!

Let's take a look at this whole priorities picture and set

the various parts in their place. It isn't half as complicated as it sounds. As a supplier or manufacturer of food products, or of machinery or equipment used in producing or processing foods, you know that armies and navies must eat. You recognize the fact that reserve stocks of many foods have to be prepared for military use. Obvious these two sources must consume tremendous quantities of foods. Your products or your machines are bound to be involved in some part of this program, entirely aside from the equally vital job of feeding the non-military part of the Nation. Even if military and Lease-Lend food requirements do get preference, here is one case where civilian needs cannot be very far behind by the nature of things.

One look at any training camp menu for a week will convince you that the military needs of the nation will cover pretty close to the whole gamut of foods processed. If you specialize on caviar or pate de foie gras, perhaps you are a bit out of fashion for today—not only from the Army and Navy viewpoint, but from the almost equally important civilian side of the picture. But aside from a very few luxuries or specialties for which there are acceptable substitutes, your products are very likely to be needed and used by the military services and Lease-Lend activities and to be still essential for civilian needs.

In general, the food manufacturer is usually quickly aware of a direct military use for his products because of direct Army, Navy, Lease-Lend or similar orders which identify them beyond mistake. This identification with direct war use should enable you to get high preference ratings for any of the supplies, raw materials or equipment you need to fill such orders. If you run into any difficulty in getting things you need for any such war order, you can quickly get such ratings from the army or navy officer or issuing agency which gave you the order. The chances are that a definite preference rating came along with the order. If you are a producer of dried eggs, you may be one of those who have been given a project preference rating covering the erection and operating of a new plant. However, such project preference ratings, or ratings resulting from so-called "defense plant" projects are so far comparatively rare in the food field.

However, you may not know of a direct connection of your products with war needs, either because you sell through channels which ultimately reach military usage unknown to you, or because your products are sold to food manufacturers who are also ignorant of the ultimate destination of their products. Yet you need things to carry on your production. How do you go about getting the preference ratings you must have in order to get these things and to establish your rightful place in today's production picture?

It's your job, you know. The man from whom you buy things cannot help you. The man you *sell* things to often can help, but you must not stop with him, if he says he cannot help you. Maybe he will have to do some digging too—for his preference ratings are up to him—and his ratings are usually your ratings.

Let's look at the machinery set up to take care of this situation. Note, please, that the discussion which follows makes no pretense to being a guide to actual procedure in filling out forms. It does not cover, except by implication, the approach you should make in stating your case, though this is often of vital importance. Much detail is omitted here, including the steps you should take when a preference rating has been issued to you, and does not produce the supplies you need. These and other details involved in the use of the forms discussed here should be taken up, in case of any doubts, with the OPM office in your locality.

The purpose here is to point out the importance of careful selection of the path or paths you use in going after preference ratings, and to indicate why a determined search for effective ratings will help you get more quickly the equipment, supplies and materials you need and establish the importance of your products in today's picture.

Preference Ratings

We have been using this phrase "preference ratings" rather glibly. What does it mean?

First of all, note that preference rating means exactly what it says, a common system of preferences or gradings of the place of any needs for materials, supplies and equipment in the relative order of their importance in the war program as a whole. This does not necessarily mean that a piece of war equipment is rated as more important than a supply of food for Army use, or even that food for civilian use does not deserve and get a higher rating than many a military item. Importance of a product in the picture as a whole is the fundamental guide.

Preference ratings function essentially in two ways: In every case a preference rating presented to you by a customer on the proper form is not only an authorization for you to supply the material called for in the order of preference indicated by the rating. It is also a mandatory order to you to supply this material. You must accept the order whether you like it or not. Similarly, preference ratings passed on by you to your suppliers in the proper way are also mandatory on them.

Note this important point, however. A high preference rating does *not* necessarily mean that you must stop work on all other production which involves a lower rating or even on that which has no rating. It *does* mean that production and/or delivery must be planned so that the delivery date or dates involves in the case of the higher rated orders *must be met*. When delays are involved in order to insure delivery dates on orders with ratings, the lower ratings must be the ones affected. A preference rating is also used as authority for your suppliers to produce and/or deliver the things you need to produce the materials, supplies, or products covered by your rating. When you are a supplier in the picture, the preference rating you use to get things you need may have come down the line from your customer, your customer's customer and even the customer of your customer's customer.

In a great many cases, a preference rating can be and is extended from an original order to which it was first applied, down the line in turn to each supplier whose products go into, or are necessary for the completion of the original order. Thus an order issued by the Quartermaster Department of the Army to a jobber of canned tomatoes, carrying an A-1 rating, can be extended in turn to the canning plant, to the maker of a labeling machine needed for the production of the order and to the producer of the paste used on the labels.

Preference ratings range from AA down to A-10 for orders on military activities (which include many nominally non-military activities). B rating range from B-1 to B-8 for the majority of civilian and non-military needs.

Relative Rating Values

AA ratings are always reserved for orders of the utmost urgency and for future emergencies. The highest regular rating is A-1-a, followed by A-1-b, A-1-c, and so on down to A-1-j. Next come A-1, A-2, A-3 and so on, down to A-10, the lowest of the A group. So far no extensive alphabetical subdivisions have been made in the A-2 to A-10 ratings.

Obviously your applications for preference ratings present a picture of the importance of your work, on which the judgment of the OPM is used to give you a suitable rating. When ratings come down to you from your customers, you have no choice in the matter, of course, the status of the proposition having already been determined. But in all cases a preference rating is the reflection of the judgment of the OPM, or of a government contracting agency, of the relative importance of an order in which your products are con-

cerned. An A-1-a or A-1-b rating puts you at the head of the line together with other firms having a similar rating. An A-9 or A-10 rating puts you down at the end of the military activities line, together with many more holders of the same range of ratings. It is obvious that the higher the ratings are, the greater is the selectivity and the fewer the number of firms having the same ratings and needing the same things. The lower ratings tend naturally to collect many more holders (particularly the A-10 rating, which tends to hold all borderline and dubious cases which cannot quite be pushed over into the B group of ratings).

Notwithstanding their relative lowness in the scale, these B ratings should not be regarded as worthless, however. Covering non-military needs as they do, in most cases, they are not usually capable of insuring supplies of critical materials or of equipment which involves the use of such materials. Yet there are many cases where B ratings are effective and you certainly are in much more favorable position with a B rating than with none at all!

If the best your efforts yield you is a B rating, make full use of the facilities it provides. Note that the machinery for utilizing these B ratings is similar to that discussed below for A ratings. Note, too, that if, as a manufacturer of food products you are unable to obtain needed materials under a B rating, you should consult with your local OPM office and let them advise you what steps to take.

While the A rating is essentially used for military activities, there are a number of important civilian activities which are given A ratings. And all A ratings, regardless of actual use of the products concerned, are regarded and are to be reported as military activities in any reports or applications made to the OPM in connection with priorities.

At the present time, the newspapers are full of references to coming changes in the priorities system, under which allocation will take a much more prominent place in the picture. This development is unquestionably coming, but it will be well to remember that when your ability to get needed materials will depend on the judgment of officials who may or may not be familiar with the nature and importance of your products in the war picture, the evidence you will have compiled by utilizing the present preference rating system may be mighty important. That is, where you have searched for and found connections between your products and first line military activities which would not have been disclosed if you had not made the search, the relative importance of your organization in the whole program is much more definite. This data will mean a whole lot more in the ways of allocation than a statement as to the obviousness of the importance of baked beans or chili sauce in Army, Navy or Lease-Lend activities. You should persist in efforts to track down preference ratings originally issued on military or Lease-Lend projects or activities, which should have been extended to you if any of your products are ultimately needed by such agencies. This tracking down often brings to light not only an A rating, but a relatively high A rating.

Of course, a low A rating is not necessarily to be despised, not only because all A ratings are automatically classed as military, but because this preference rating system involves relative delivery dates, as well as relative importance. There are A ratings in the lower brackets, put in that category because the required delivery dates for the products involved are some time ahead.

Of course, if any A rating does not produce materials

SUMMARY

YOU get the following types of ratings chiefly from your customers in the form of extensions to you (usually from their customers). You may also get them directly from the Government contracting officers or agencies, and from the OPM:

Preference Rating Certificates or Preference Rating Orders—These ratings tend to be in the highest brackets. They are particularly desirable in getting speedy delivery of equipment. It is true that Form PD-1 is widely used for asking for preference ratings on equipment, but where equipment is needed to supply materials called for by military needs, it is entitled to the rating available on preference rating certificates PD-3, PD-4 or PD-5 or on preference rating orders, (which are, however, comparatively rare in connection with food products). Such certificates or orders should also be sought for in connection with comparatively large quantities of supplies or raw materials where lower ratings would mean delays in filling orders.

● You get the following types of ratings chiefly by application to the OPM, though many are also passed on by customers:

By Use of Form PD-1—Here you apply for a rating on scarce and needed materials, supplies or equipment, subject to delays, particularly where your supplier has to obtain supplies to fill your order. In general, this form should be used chiefly to get a preference rating on that part of your production which is definitely non-military or concerned with civilian needs or public health in classifications not otherwise provided for in existing OPM orders. It is, however, also useful for food processers and their suppliers wherever a doubt exists as to the ultimate use of any specific order. It works very well in cases where you are sure that your supplier will not need to go to anyone else to fill your needs.

By Use of Form PD-25-A—This form is used in connection with the new Production Requirements Plan, leading to a rating which is far more in agreement with your actual importance in the war picture than the old A-10 of the Defense Supplies Rating Plan. It allows you to use this rating in getting needed scarce production materials, maintenance, repair and operating supplies for a three-month's period, beginning with January 1. (If you apply late, you will be covered for the remaining part of this first quarter of 1942.) It must be renewed for each quarter of the new year.

Use it for all needs except equipment or capital goods.

required when they are needed, consult your local OPM office for advice—don't go to Washington!

The most recent development of the preference rating system is the new Production Requirements Plan. It is only mentioned here, but will be discussed in detail further along. Keep it in mind when studying the data outlined below. It is particularly suited to the food industries.

So much for preference ratings, from the aspect of what they signify. But how do you get them? The following data refers to the procedure you should follow in going after preference ratings.

Form PD-1

Form PD-1 was set up and is still used for the purpose of presenting your case for needed equipment, materials and supplies to the Office of Production Management. It is used to permit them to study the facts—particularly your statements as to the importance of your products in military work—and select a preference rating which will put your needs in the proper place in the waiting line when considered from the overall military viewpoint, with due consideration of the national economy as a whole, and the importance of the delivery dates involved to the entire program. When you fill out Form PD-1, you list specifically the things you need, the quantities involved and the supplier or suppliers from whom you expect to get them. You also submit, in Paragraph 10 of Form PD-1 or in an accompanying letter, your own picture of the place of your products in the military program or in the national economy, along with any data which will help your case. Even if you are certain that your products are not in any way connected with the war, or that their military uses are negligibly low, you have the right to show their importance in the maintenance of public health, in civilian needs and in the carrying on of non-military industrial operations. A place in the line waiting for scarce materials is important, even if it is way down at the end. But make your story as brief as possible.

However, do not fail to be specific in filling out this form. The story of the two makers of catsup may be a bit overdrawn, but chiefly because it is oversimplified. It seems that each of these gentlemen needed a new cooking kettle for producing catsup and each followed proper procedure in filling out Form PD-1. But Manufacturer A simply stated that he was making catsup, while Manufacturer B amplified his statement to the extent that he was making catsup for the Army. B got an A rating. A got a B rating, or none at all, depending on who tells the story.

As a matter of fact, if either of these apochryphal gentlemen had been working on a Lease-Lend, Navy or Army order for catsup, issued directly to them, the chances are mighty favorable that they would have already had a high A rating on the order for catsup, which would have been able to get them the needed kettles in jig-time. And if the order had come indirectly from the Army, Navy or Lease-Lend, and the issuance of a preference rating certificate had been overlooked for any reason, a little investigation on the part of Messrs. A and B would have disclosed the fact that they were, indeed, working for the Army, Navy or Lease-Lend program, a fact which no one in his senses would fail to note on the proper part of Form PD-1.

The whole point of the story is the essential need for putting all the facts that bear on your place in the war picture down on this form in the proper place, leaving as little as possible for imagination or the detective instinct of the men who pass on your case. Form PD-1 goes to the OPM-Priorities Division in Washington. There it is studied and a preference rating is assigned to your requirements. Note that it is advisable to make out a separate PD-1 form for each class of supplies you need. Where all kinds of materials are included on one form, the application must be routed through many committees, thus leading to much delay. Individual groups go immediately to the proper committee and much quicker action results.

PD-1 Procedure

Your filled-out form, when it has been acted upon, is authenticated by the OPM and the preference rating assigned is noted on the form and its copies. You get this form back and then serve it on your supplier. This authenticated form going to your supplier is his authority to fill your order in accordance with its place in the picture established by the assigned preference rating. But if he, in turn, needs materials from some other source to fill your order, *he cannot extend his authenticated PD-1 form to his supplier or suppliers.* He must, in his turn, make out a fresh PD-1 form, in which his case and your needs are presented. This procedure must be followed as many times as are necessary, until a final supplier is reached who can deliver the needed materials without going to another supplier.

Hence Form PD-1 is not always satisfactory for your purposes. It has the advantage of being available to all, whether engaged on military work or not. It can and often does provide high ratings. On the whole, however, because of the common difficulty in establishing close relationship to military work, ratings tend to be lower in the scale. Above all, the delays involved in repeated re-use of the form, where needed materials come from a series of suppliers, are not necessary if you are entitled to extensions of high ratings applying to your products. These extensions (of either preference rating certificates or orders) come from your customers who, in turn, may have to get them from *their* customers.

Preference Rating Certificates

If you have a direct order from the Army and Navy; from one of a number of Government Departments, or from Great Britain or any other foreign government under the Lease-Lend category, you usually do not have to apply for a preference rating. Instead, the contracting officer or agency supplies a preference rating with your order—usually high up on the scale. When you have a preference rating certificate from such sources, you have achieved the easiest and quickest path to getting what you need. All you have to do is to fill out Form PD-3 (for Army or Navy orders); PD-4 (for other Federal Government orders), or Form PD-5 (for certain foreign government orders: i.e. the British Empire and the government of any other country whose defense the President deems vital to the defense of the United States). Then a smooth, rapidly functioning machine is set in motion. Note that these PD-3, PD-4, and PD-5 forms are not made freely available, and can be used only if your product is required in the production of Army, Navy or similarly rated work. Note once again that evidence of such use will come to you in the form of an extension of one of these forms from your customer and in turn from *his* customer, up to the point where the primary contractor holding the original preference rating is reached.

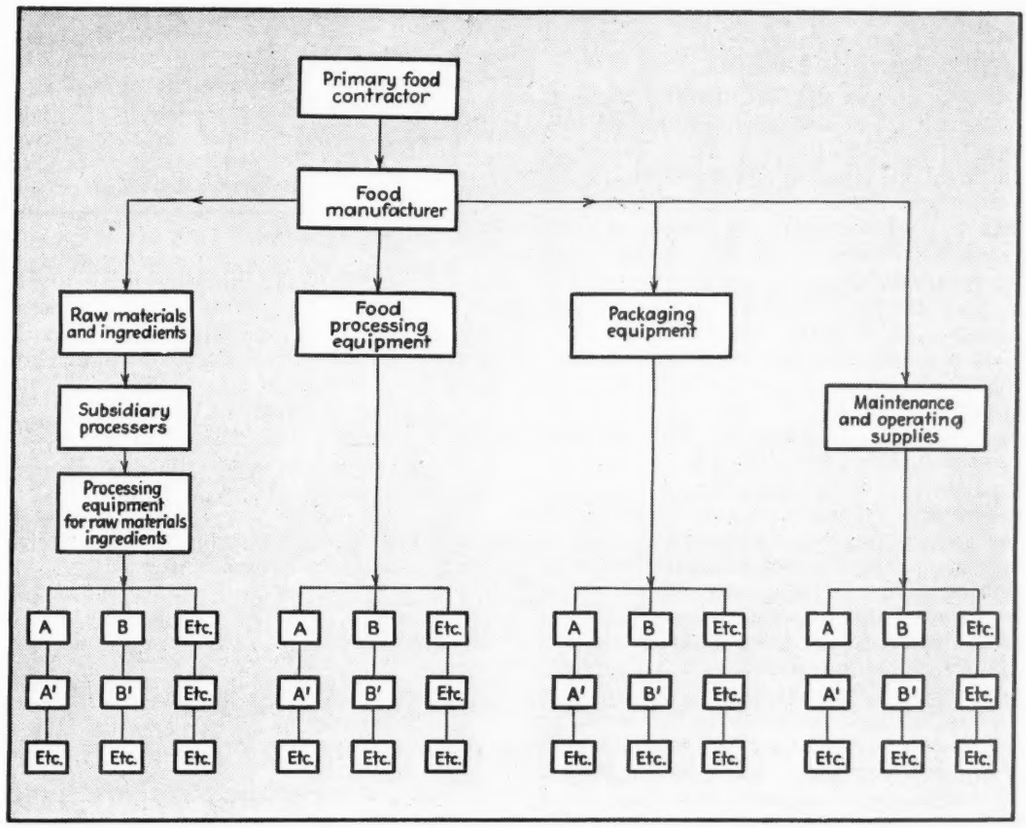
Extending PD-3

When you fill out one of these forms, and have it signed by the proper authenticating office of the military activity concerned, your supplier, if he needs materials to fill your requirements, simply fills out another PD-3, PD-4 or PD-5 form, addressed to his supplier, has it authenticated by the most conveniently located office of the military activity involved in his locality, and sends it on to his supplier. This process can be speedily repeated until the final supplier is reached who can ship the needed materials without reference to any other supplier below him in the chain.

If by some oversight you have not been supplied with a preference rating, though working on a direct Government contract, you can easily get it by applying to the contract

Flow of orders resulting from a single primary defense contract

(As for canned foods)



officer or agency, or the OPM located in Washington.

Note that once *any* company has been assigned a preference rating for a contract as a result of direct governmnet orders, there should be set in motion a chain of PD-3, 4 or 5 forms which should reach down rapidly to every company concerned with supplies of any kind which go into the production of that order. It is the failure of essential links in this chain to materialize which explains why you do not get as many high priorities as you should—and at the same time, indicates a cure for the situation. This subject will be discussed in detail later.

These three forms, PD-3, PD-4 and PD-5, are the only extendable preference rating *certificates*, though blanket preference rating *orders*, discussed in the next paragraph, are also extendable. Food manufacturers suppling Army, Navy or Lease-Lend projects should be provided with these certificates virtually automatically—either direct from the government purchasing agency which issues the order, or indirectly, by extension from the contractor receiving the original order, if it is not the food manufacturer. It is advisable to make sure that you have not overlooked the existence of available preference rating certificates in connection with any part of your production, if only because they usually carry a high rating which will materially expedite the obtaining of supplies, materials and equipment you may need to produce that part of your product to which they apply. It will pay you to trace the orders you receive, to dig out as many such certificates as you can.

Preference Rating Orders

For many producers of supplies, materials and equipment used in the military program, preference rating orders are fully as effective as preference rating certificates. These orders are often called limited blanket rating orders and apply to certain manufacturers or to projects which are deemed important in the military picture. They are obtained from the OPM and are not issued by contracting officers or agencies of the Army, Navy or other Government departments. They are obtained as a result of application on suitable forms to the OPM for such preference rating orders, either because the OPM has issued a blanket priority setup for certain types of manufacturers, or because the specific things produced have a vital part in the war program and are recognized as such by the OPM.

However, there have been very few such blanket orders issued so far for food products. Some 40 new plants for the manufacture of dried eggs and related products have been given a project preference rating, covered by suitable orders. There are similar orders for certain can machinery manufacturers and for makers of cans for salmon, field rations, etc., but by and large, food products have not received much general recognition in this preference rating order category. It is possible, or course, that orders of this kind may be issued from time to time and in greater numbers. You should be on the lookout for them, when and as they are issued, of course.

On the whole, however, the food manufacturer, and the manufacturers and suppliers who are dependent on his activities, must turn to the use of such preference rating certificates as can be obtained, to form PD-1, or to other plans discussed later.

Before leaving the subject of preference rating orders, however, it should be understood that while they are extendable, the procedure is not the use of certificates, such as forms PD-3, PD-4 and PD-5.

Instead they are extended by the simple procedure of

making a copy of the preference rating order itself and passing it on from supplier to supplier. Like the certificates, they can thus be extended indefinitely, as long as any needs connected with the original order are involved.

Investigate the Chain

Preference rating certificates and, to a limited extent as far as the food manufacturer and related firms are concerned, preference rating orders, are supposed to initiate an unbroken chain from the prime contractor down to the ultimate supplier who can furnish needed materials without need of a preference rating—because he has stocks on hand, or can get them from *his* supplier without a rating. If at any point in the chain a supplier does not ask his customer for an extension of either a certificate or an order, to pass on to his supplier, all the remaining firms below this supplier in the chain are unable to identify themselves with the original project. The same thing happens when the holder of such a certificate or order does not pass it on.

This break in the chain not only works extensive hardship on all subsidiary suppliers, but also tends to defeat the whole purpose of the priority system. The connection of every firm involved with a military project is going to be all the more important as allocation comes into the picture. Hence, it is highly important that you make every effort to reinstate the broken chains as far as possible, by tracing through your customers (and insisting that they trace through *their* customers and so on) the ultimate source of all your orders, until you or they finally unearth the preference rating certificate or order which has become lost through this break in the chain—or until you have definitely determined that no such situation exists in connection with any one or any group of your orders.

You are not supposed to use a preference rating if you can get the material you need without it, of course. But this investigation of the chain is nonetheless imperative, because today the instances in which you do not have to use these ratings are getting fewer and fewer. For the sake of a clear understanding of the part of every manufacturer entering into the military program, this tracing effort is highly important.

Defense Supplies Rating Plan

It was recognized by the OPM that the ordinary procedure in getting priorities did not insure effective and economical plant operation in many cases. Therefore, a plan was set up to enable plants to order necessary supplies of working stocks over a three-month period. Another reason for the development of this plan was the difficulty of ordering many needed supplies on a piecemeal basis.

The resulting plan was the Defense Supplies Rating Plan. Under it any manufacturer could use a form (PD-25) to ask for an A-10 preference rating which applied to orders for needed scarce materials specified in his application. While this rating was applicable to a period three months in advance of the time of issuance, it was based on defense orders not yet received by the applicant, but expected on the basis of and in proportion to past experience.

At the end of this first three month period, this rating had to be renewed, but during the time it was in force, those who held the rating could order and obtain that percentage of their requirements in scarce materials and supplies for production purposes which was covered by their defense orders, based on past experience.

You are probably already familiar with the Forms PD-25-C and PD-25-D which have been widely used by your suppliers (and probably by your own sales department). On these forms, in default of preference rating certificates or orders, a customer can provide a definite estimate as to what part of the material or equipment he uses is used in defense. These forms have no value to the supplier in obtaining the things *he* needs to fill these orders, except to build up a picture for his own use in applying for a preference rating (on Form PD-25, under the old Defense Supplies Rating Plan, or from now on, under the Production Requirements Plan on Form PD-25-A). Note also that this data is useful in filling out Form PD-1.

Preference Rating Chart

FOR:	FIRST CHOICE	SECOND CHOICE
Equipment of All Kinds	Preference Rating Certificates or Orders extended to you by your customers and *their* customers.	Form PD-1
Production Materials, Maintenance, Repair & Operating Supplies	Production Requirements Plan.	Order P-100 for maintenance, repair and operating supplies *only*.

Using Form PD-25 under the Defense Supplies Rating Plan, you would have used the data from these PD-25-C and PD-25-D Forms, and all other preference rating certificates and orders you had received, to arrive at your calculation of what percentage of your total sales volume constituted defense work. After analysis and review, the OPM gave you an A-10 rating applying to the scarce materials you asked for on the form, based on the percentage of your past sales that were concerned with defense work.

Under the Defense Supplies Rating Plan the best you could obtain was an A-10 rating. And you were limited to production materials only in using this plan.

The New Production Requirements Plan

This new plan, which goes into effect on January 1st, replaces the Defense Supplies Rating Plan. It covers the same ground as the old plan in much the same way, but is extended to include maintenance, repair and operating supplies as well as production materials. In other words, under the new plan, you apply as before, using the new Form PD-25-A, stating your consumption of all needed supplies in the categories outlined above for the quarter ending September 30, 1941 and estimating your requirements in these materials for the first quarter of 1942. The form also provides space for you to indicate your production (defense and non-defense) for the calendar quarter July-Sept., 1941; your estimated production for the calendar quarter Oct.-Dec., 1941 (in case you use the form prior to January 1, 1942) and your estimated production for the first quarter of 1942.

It also provides for inventories of raw materials, work in progress, finished products, supplies, etc., as a picture of your condition as regards needed supplies for three dates—June 30, September 30, and the date of your most recent physical inventory.

The place of your company in the war picture is measured by the analyses you make on this form. First, your dollar volume as split up by known and assigned A preference ratings; reported defense activities percentages from your customers (on Form PD-25-C); known and assigned B ratings; known non-defense orders and finally, that part of your total volume whose defense status is undetermined. This analysis provides factual data for safe and fair judgment by the OPM as to the actual importance of your work as measured by the recognition it has obtained through previous functioning of the preference rating system.

Second, your place in the picture is measured by an analysis of your dollar volume by markets served, so that your services to important industries or activities can be shown.

These two analyses make possible a far better means of

placing your company in its proper place. They enable many a company which, under former plans, had difficulty in establishing its importance, to get recognition. In fact, under the new plan it is expected that many companies which found it difficult to show their place in the picture will obtain much higher ratings than before, even though their work may not be as much concerned with direct military activities as many companies which have been getting high ratings.

In general, the new plan will function like the old Defense Supplies Rating Plan. Initial ratings issued for applications covering the first quarter of 1942 must be renewed for each succeeding quarter of the year. The preference rating order may be extended very readily, by using the following statement on orders:

"Preference Rating A—is applied hereto under Preference Rating Order No. P Series Number(s) ..... with the terms of which order the undersigned is familiar. This rating may be extended *only* upon the terms of said order, copies of which may be obtained from the undersigned or from any office of the Office of Production Management."

This statement must be manually signed by an official duly authorized for the purpose. The rating assigned, the Preference Rating Order number and the serial number must also be specified.

As previously noted, this new order covers much more ground than the old Defense Supplies Rating Plan. It includes maintenance, repair and operating supplies, which up to this time were covered by Preference Rating Order P-22. You may still use P-22, but since it is possible to get one rating covering production materials and maintenance, repair and operating supplies under the Production Requirements Plan, there is little point in using P-22 if you can qualify under this plan.

As a matter of fact, you are prohibited from using P-22 if you have applied for and received a rating under the Production Requirements Plan. You are also not to use any other extended preference rating orders or certificates of any kind to obtain the materials covered by this plan, once you start to operate under it.

Of course this plan does not cover machinery, equipment or capital items. It cannot be used to get them. Form PD-1 or preference rating certificates or orders must be used for such things, as before.

There may be occasions when extensions of preference rating certificates or orders may be used to obtain production supplies as opposed to equipment or capital items, even when you are operating under the Production Requirements Plan. To do this, permission must be obtained by writing to the production requirements section of the OPM, giving a full explanation, including the other Preference Rating Order or Certificate number, the rating and the quantity of material involved.

For the food field, this new plan seems particularly desirable, in that the importance of the food industries in both war and civilian activities can be most readily demonstrated by the use of Form PD-25-A and all requirements in production materials, maintenance, repair and operating supplies can be given a desirable and effective rating. Thus all essential needs except those of equipment are met with one blanket application and rating.

However, it should be remembered that it is still important to identify yourself as far as possible with important work—and hence, to get evidence through extensions to you of both preference rating orders and certificates, even though, if you operate under this plan, you will not be able to extend them to your suppliers. Remember too, that even if you do not use this plan your suppliers need the data you can furnish them on Forms PD-25-C and PD-25-D to enable them to apply under this plan, for supplies and materials they need to fill some of your orders. Cooperate with them by answering their requests for these filled in forms.

Make up your mind to investigate the possibilities of the Production Requirement Plan as soon as possible. Remember that in determining what preference rating you will be given under this plan, the OPM takes into account not only the amount of military business you do, but what essential civilian volume you produce—and the end use of the products you make. This means that you will have a better chance of a better rating than A-10.

Maintenance, Repair and Operation Supplies

As noted above, you can take care of all your needs along these lines under the new Production Requirements Plan. For those who do not care to operate under this new plan, there is a special preference rating order, carrying the rating of A-10 on maintenance, repair and operating supplies of all kinds. This is Preference Rating Order P-100. Originally, this order applied to certain selected industries (of which the food industry was one) but covered only materials and parts required to carry on repairs needed to meet an imminent or actual breakdown—or to maintain an emergency inventory to provide for repairs to meet an actual or imminent breakdown.

This originally narrow scope has since been broadened to cover not only manufacturers of all kinds, but warehousers and wholesalers as well, and to cover all materials necessary for the full maintenance of plant and equipment as well as repairs and all *operating supplies* needed to carry on business. Obviously, you are not supposed to get more than you need—and operating supplies are not to be considered as including production equipment—but this order removes what has been for some time a serious handicap in military production.

Preference Rating Order P-100 differs materially from other orders, in that no copies of the original order are required for its extension, and no application for the order itself is necessary by any food plant. If you need parts or materials for repair, all you have to do is to put the following statement on your order to your supplier and see that it is countersigned by a responsible official of your company: "Material for Maintenance, Repair or Operating Supplies, Rating A-10, under Preference Rating Order P-100, with the terms of which I am familiar."

Your supplier, if he needs materials to fill your order, simply puts on his order to *his* supplier, without reference to your specific requirements or to your company, the following statement: "Material for Maintenance, Repair or Operating Supplies, Rating A-10, under Preference Rating Order P-100, with the terms of which I am familiar."

Play the Game

In the past there has been too much table thumping, too much special pleading and too much dependance on friendship in this priorities situation. These methods worked because the pinch had not been greatly felt and the temptation was great to serve old customers or to get a foot in the door in places hitherto hard to sell. But from now on, in the face of specific shortages felt on all sides, these tactics will not work, however human the motives may be that prompt them.

Do not blandly assume that it is up to your suppliers to get preference ratings for you. The shoe is on the other foot. That's your job. Don't delay doing it.

If you have any preference rating certificates or orders, whether received directly from a Government contracting agency or the OPM, or indirectly through any of your customers, be sure to extend them to all your suppliers with every order you issue for supplies, material and equip-

ment to be used on orders to which they apply. Do not wait for them to ask for extensions. Even though a supplier does not ask for an extension, remember that somewhere down the line there will be a company which wants to identify itself actively in the war effort, but will be unable to do so unless you maintain the links in the chain by extending all ratings you have.

You may be and probably are a sufferer in this respect yourself and have no preference ratings on a great part of your production, although you know that much of it ultimately finds its way into military channels, and that your product is fundamentally essential from a civilian point of view. Don't congratulate yourself on being able to avoid a lot of priority paper work if you are temporarily getting along all right without ratings on this production. You should have specific evidence of the part this portion of your sales volume plays in the war effort, to insure supplies. And you, in turn, should play fair with suppliers below you in the chain who need these ratings, even if you think you don't.

Here is a point worthy of very close consideration: Food processing equipment of practically every kind is rarely used so that it is always working on non-defense items. It might be used so little for war work that only 5 percent of the output of a unit is actually used eventually for that end. But —and this is important—if this unit is absolutely essential for the production of that 5 percent, it must be considered as 100 percent essential for war. You cannot apportion equipment as you do raw materials.

Hence from the equipment viewpoint, in particular, every high preference rating you can unearth in connection with your products has a bearing on your ability to get needed equipment.

Getting High Ratings

How to unearth these high ratings? Go to your customer. If they have no preference ratings applying to those of their products which require supplies from you—see that *they* take the next step. Insist that they ask their customers for ratings, and, if need be, that they ask their customers to continue this search for ratings until, somewhere along the line, a preference rating is met.

Then, by extension of orders or certificates, depending on the form of the rating, the process is reversed and in a reasonably short time you will get a rating in a form to extend in turn to your suppliers. This seems a slow process and it is. But it works! For example, only the other day we heard of a typical case. A manufacturer of equipment received and passed on for needed steel a mighty attractive A-1-a preference rating from a certain company. Yet this firm had insisted, until the unearthing process was explained and sold to them, that they had no ratings—had no way of identifying themselves with the war effort, and were not particularly interested in going through the trouble involved in searching for a rating. Now they will get the equipment they need and do a worthwhile bit on defense which might otherwise have been impossible.

What alternatives have you? Your work is intrinsically important to the war. If you depend entirely on the ratings you can get, where preference rating orders or certificates do not reach you automatically from your customers and *their* customers, you will not be benefitting by many higher ratings which you deserve when you have identified any of your products in any volume with military activities. Low ratings, not necessarily handicaps, may nevertheless delay important work, which is unfortunate when this identification would have been possible except for failure to pass on to you higher ratings on orders or certificates from primary suppliers of war materials.

If you are determined to hunt down such high ratings as are in existence, often unknown to you because somewhere above you in the chain some firm has not asked for or extended a preference rating, you will find yourself with more and more high ratings, for rapid and effective use in getting supplies, materials and *particularly* equipment on practically all of your total production volume.

Remember that no one wants to fill out any more forms than he has to. If a holder of an A-1-a preference rating finds he can get any one thing he needs without executing and passing on a PD-3, PD-4 or PD-5 form, he will not do it. The supplier who neglects to demand such a form, even where he can just manage to supply needed material without an buying from *his* suppliers, is doing the whole military program serious injury, because he has broken the chain which will enable all the other suppliers below him to identify themselves with highly essential military work. After all, when such a firm does break the chain, it is depleting supplies of needed items which will have to be replaced for future needs along the same lines, so that the essential purpose of the plan is defeated anyway. Of course, one of the primary objectives of the war program is to keep inventories low and turning over as rapidly as possible. You must bear in mind that you must avoid excessive stocks.

Preference ratings are up to *you* whether you like it or not. Go after them no matter how much you dislike the job. Forget the old ideas of not annoying customers. Remember that customers are sellers as well as buyers and need the same kind of information you do today for the same reasons. Without adequate ratings the day will come, not many moons ahead, when your production will suffer and your place in the picture will be too low for comfort.

REPRINTS ARE AVAILABLE

A limited number of reprints of this article is available to food manufacturers at a price of 20 cents each. They should be ordered through "Food Industries," 330 West 42d St., New York, N. Y. It is suggested that anyone desiring reprints order them promptly, before the supply is exhausted.—The Editors.

Watch Your Water Supply—It Affects Food Quality

By K. G. WECKEL

Department of Dairy Industry, University of Wisconsin, Madison, Wis.

Water can affect the quality of food products in a multitude of ways. Even the water used for cleansing purposes is likely to leave deposits that change flavor, odor or color. Some of the things to guard against in water properties, and what to do to overcome water difficulties, are set forth in this article.

SOONER or later, all individuals learn that the waters of different places are endowed with especial characteristics. The weavers of some oriental rugs are convinced that the wearing and coloring qualities of their product are due to the waters of certain streams in which the wool is washed. The springs and streams of the Turkish Georgias give forth waters that curdle milk, or which may be bitter with the salts of alkalinity. Ailing peoples drink, bathe and sweat in the waters of Saratoga, Hot Springs or French Lick. The waters of the Yellowstone area are vivid with the colors of their chemical inheritance. The merit of certain beers, and irrigated crops, is frequently laid to the effects of the water supplies. The transient visitor need but become thirsty to realize suddenly that what seems to be water with an obnoxious if not intolerable flavor is but normal fare to local inhabitants.

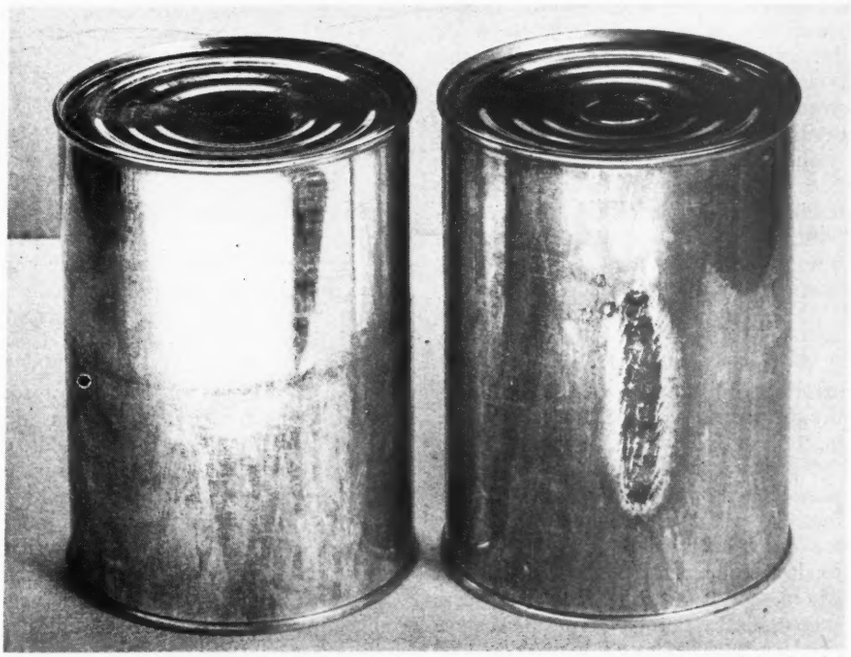
These are somewhat dramatic manifestations of variations in the chemical character of our water supplies. The water from every well in the country undoubtedly differs from all the others in some respect; probably no two are alike. Many are warm, some cold, some corrosive, some damaging to flavor, some loaded with organic or mineral material. The job of getting water, adapting and using it economically for all our purposes is the backbone of a great food industry in itself, and accounts for a recognized organizational profession, a public utility. Yet in spite of the evident differences in the quality of waters, many food or product manufacturers belittle it as a commodity. Many times it is considered only in the matters of availability, and the job of getting it where it may be used.

Factors in Water Quality

There are many qualities that determine the worth of a water supply to a food processor. Among these are:

1. Acceptable flavor and color;
2. Clarity, freedom from turbidity, particles or sediment;
3. "Inert" chemical properties;
4. Uniformity in composition;
5. Bacteriological acceptability;
6. Availability in volume;
7. Acceptable temperature.

When used in the food plant, seldom does a water supply have acceptably all of the above interpretations of quality. In some way usually a water supply must, or ought to be, modified.



Continental Can Co. photo

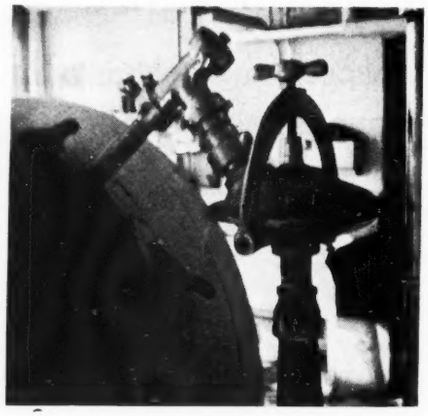
Alkaline water is corrosive to tin. Can at left processed so that bottom portion was immersed in alkaline water while top portion was heated in steam. Note spangling in bottom half. Can at right was entirely submerged in alkaline water during processing and was also in contact with rusty iron of retort crate at detinned spot apparent in photograph. Notice also the spangling.

Waters from different sources available in the same plant may be made to perform certain functions economically. In one milk condensary the waters from two adjacent wells, drilled to different depths, differ in temperature and composition. The colder water is used in can cooling and cooler operations; the warmer, which also has better chemical properties, is selected for boiler use. Water from impounded sources or lakes may be used to advantage in the winter as an inexpensive means of refrigeration for certain cooling purposes. But such waters should be passed on as acceptable for the purpose, after being purified, by recognized health authorities.

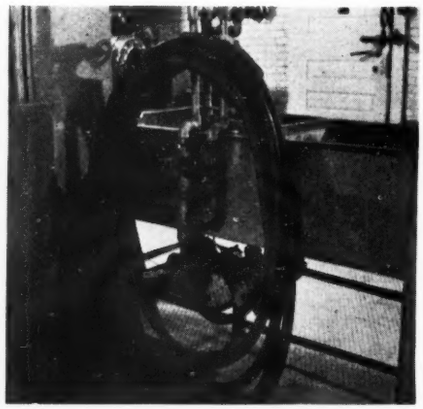
Water may be easily contaminated. The alkali soaker compartment of a milk bottle washer in a dairy plant was heated by exhaust steam from a steam generator. Lubricating oil carried over in the steam caused an iridescent oily film to cloud the bottles. Improperly lubricated well pumps also have been known to produce oil-contaminated water. A very common mechanical contamination of water is the carry-over of metals, or organic material, in the steam to heated water. Either normal priming, or the effect of added softeners, may cause the discharge of wet steam. Wet steam used to heat water for washing or rinsing purposes may readily affect food products since it may carry extraneous material into foods. Such waters often leave a residual scum difficult to remove, particularly from wooden surfaces. The carry-over in wet steam may be minimized by such devices as cyclone separators within the boiler drum, or the scrubbing of the steam by water fed into the boiler. The discharge of corroded material (frequently line condensates, iron, scale) from steam lines into water used in the handling of foods also introduces extraneous material into the foods. Deterioration of fats may be initiated or catalyzed by the dissolved elements.

Flavor, Color, Turbidity

Water flavor defects, such as flatness, extremes of bitterness, salinity or acidity, the presence of volatile odors of organic matter, sulphur or industrial wastes, or the presence of foreign flavors such as phenolic wastes, can readily damage food flavors. When these flavor defects are quite evident, their effect on the foods can be readily ascertained. But when the flavors of the waters seem acceptable to normal taste, their beneficial or detrimental effect on foods can best be determined by making comparisons with waters of known properties, i.e., reaction, flavor and bacteriological and chemical composition.



Water strainer using replaceable cloth filter for straining hot water used to wash butter churn.



Rubber hose can be readily kept off the floor in food plants by use of a hose hanger and by seeing that employees get the habit of hanging hose up when not in use.

Whether or not the local water is doing justice in preserving the fresh flavor and physical characteristics of a food or beverage can be determined by such tests. The tests should include the factor of storage time, since presence in minute quantities of constituents such as iron or copper, or organic particles, may be responsible for degradation of the food in storage. Color in water is indicative of dissolved or suspended matter. Colored waters may affect the "whiteness" of solid foods, or the clarity and translucence of sirups or beverages. Do the agents responsible for coloring of waters affect the product? Iron and copper compounds, as well as other metals, and organic matter may do so. Carbonation intensifies vegetable and water algae odors, and heat as used in sterilization may cause the breakdown of dissolved organic matter that may affect the product, or its container, as in the blackening of tin by released sulphur.

Bacteriological Problems

There is a great tendency to assume that potable waters suitable for human use are bacteriologically acceptable for food products. While waters may be free of pathogenic organisms, they frequently contain organisms that may cause food spoilage. A few examples may serve to illustrate the point. A manufacturer of cream cheese spread carried out the drainage of whey from the sacks of cheese placed on stainless steel drainage tables. The sacks were covered with cracked ice made from a city water supply, but contaminated by a fermenting organism. Within a short period the cheese spread acquired a disagreeable flavor.

During the past decade there has occurred with greater frequency, virtually to the point of being epidemic, defects in butter of proteolytic decomposition often called "limburger flavor," or "surface taint." During this period, increasing amounts of butter have been made from sweet, rather than sour cream, and the added salt content has been reduced from 50 to 100 percent. Water is used to wash a major portion of the buttermilk retained by unworked butter granules in a churn. Water in some creameries, even though potable, has been shown to carry proteolytic organisms, which under the circumstances of low acid and salt in the butter are able to carry out proteolytic decomposition and produce the surface taint. Chlorine sterilization or heat treatment of contaminated waters is necessary to destroy the organisms. It is interesting to note that in one creamery where heating of the water supply was employed to eliminate proteolytic organisms, a secondary problem of breakdown of dissolved organic matter by heat was encountered. The organic products affected the flavor of the fresh butter and caused a film to deposit on wooden surfaces.

Recently, carload shipments of sweet cream sent from a Midwest creamery to an Eastern market were being threatened with rejection because of high bacteria numbers. The cream was of excellent quality when shipped. During refrigerated trans-shipment, organisms traceable to the water supply and possessing the faculty of growth at low temperature, multiplied sufficiently to interfere with salability of the cream. The contamination of the cream with these organisms came through the use of a weakly chlorinated community water supply for rinsing the washed cans, utensils and equipment in the creamery.

There is now evidence that the creameries and dairy plants within a

given region in one state are experiencing considerable difficulty with water borne nonpathogenic organisms. Exceptionally high yeast and mold counts in butter were being obtained by a Northwest creamery. The yeasts and molds were traced to the water supply of the small community. It was with difficulty that community officials were induced to chlorinate water sufficiently to destroy the organisms because of the objection to chlorine taste in the water.

Another example of food contamination by improper water supplies has been reported in the washing and icing of crabmeat. In all probability, broader use will be made of bacteriological technics to ascertain the sanitary quality of many "fresh" food products. While bacteria numbers retained in frozen foods have been shown not to be of public health significance, the importance of types of organisms is not thereby minimized.

Precautions Needed

There is a tendency also to assume that potable water is intended only to be dispensed from drinking fountains. The idea that the quality of water used in the preparation of foods should be as clean and wholesome as drinking water is sometimes lost. Common violations of the elementary bacteriological principle of avoiding contamination occur often in the handling of water hose. Employees in intense thirst drink from the hose end, or the hose is allowed to lie unprotected on dirty floors. Men with grime loaded dripping arms direct water from a hose into storage vats or measuring receptacles. It is of little comfort to the ultimate consumer, even though a product be dried, sterilized, iced or otherwise preserved, if somewhere along the line the water has been misused. Rubber, or other hose, should be hung on hose racks at all times when not in use and not permitted to be contaminated with floor grit. The discharge ends of hose may be kept from the floor by the use of large rubber washers. Frayed, or disintegrated hose should be trimmed or replaced.

Important, too, is the necessity for assuring that water lines conveying potable water are not contaminated by water from lines conveying lake or mill pond water through leaky cross connections. Water from a free hose or pipeline should be potable. Visitors, semi-transient business agents (truckmen, producers and so forth) or even employees may fail to distinguish even marked water lines, when more than one type of water is available in the plant.

Employees should be impressed with the need for precautions in handling water supplies. In the milk industry alone, for example, water is used not only in the washing of equipment, but in such operations as washing whey from cottage cheese curd, removing buttermilk from butter granules, and as an ingredient in standardizing ices, sherbets or fruit drinks. Recently a bacteriological "infection" of yeast sent to bakeries, and organisms particularly resistant to the carbonation treatment of beverages, were traced to the water supply. In these, as in other food operations, the water should be pure.

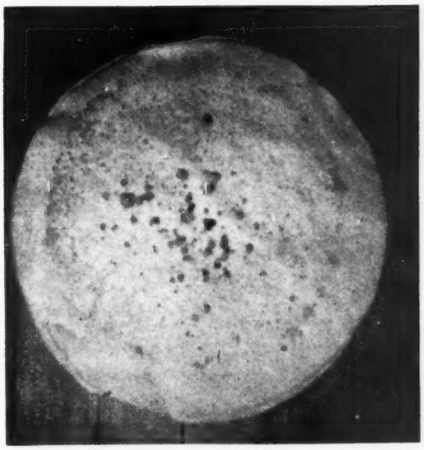
Variations in Water Constituents in 100 Cities *

Constituent	Factor indicating range from smallest to greatest value	Range, in p.p.m.
CaO	47.7	3.1 –148.05
MgO	965.1	0.066– 63.7
Na & K.....	114.0	1.9 –216.0
Chloride	203.0	1.0 –203.0
Sulphates	265.8	0.7 –186.1
Carbonates ..	67.5	5.1 –342.0

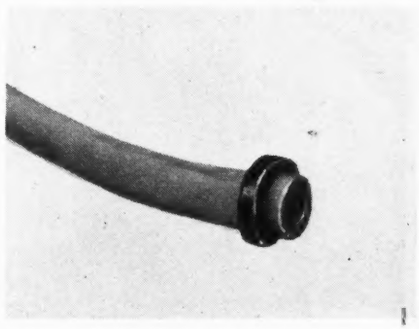
* From FOOD INDUSTRIES, Vol. 4, page 89, 1932.

Variability in Composition of Water

Unfortunately, the composition of water supplies in many places varies from day to day or season to season. Waters from shallow wells or surface runoffs, or rivers affected by industrial wastes, are the most subject to change. Thus a water supply doing a good job today may not be "the" water supply tomorrow. Food processes standardized to give desired results in a product in one part of the country may not be successful in another part of the country where the water is different. In the accompanying table is shown the variation in certain constituents of waters in 100 American cities.



Sample of extraneous calcareous and metal particles removed from water heated by direct steam and used for sterilizing a butter churn.



Method of protecting end of water hose from contamination by use of rubber washer.

During certain seasons, the sodium chloride or organic matter in the water (surface water sources) may be much greater than at other seasons. Rainfall tends to increase phenolic substances from road materials or organic decomposition. Industrial wastes poured into rivers have an effect depending on discharge rate and river water volumes. It is evident that while these waters may be clarified to the point of being potable, their chemistry is such they may be very deleterious to food products. Traces of iron and copper affect the oxidizability of fats, phenolic substances in the presence of free chlorine impart medicinal flavors, and mineral salts affect the turgidity or tenderness of vegetable tissue.

Chemical Effects of Water Supplies Must Be Watched

The all-around universal solvent is water. The substances it may carry, and the effects of these substances, are many. Aside from the engineering problems of boiler corrosion and scale deposition, water may have many effects on food processes, and the behavior of foods in the hands of the consumer. In the milk industry, for example, cream when used in coffee may "feather" or form a gray film on the coffee surface which may be due in part to the hardness of the water used in brewing the coffee, or to the time in which the coffee is brewed. Water of exceptional hardness may cause curdling of milk added to cooked hot wheat or oatmeal cereals; when homogenized, the milk is more susceptible to the curdling action. Similarly, the baking quality of flour, the appearance of the bread, or the color and texture or consistency of certain candies may be affected by the water.

Over-condensed evaporated milk is standardized by the use of water. If water of high calcium or magnesium hardness is employed, the body or viscosity of the sterilized milk may be increased to the point that reduction in sterilizing temperature or time is necessary.

Decomposition of temporary hard-

ness in water may be responsible in many instances for the lack of clarity of fruit sirups in canning. Undue hardness of water used in vegetable canning may cause toughness in such products as peas and beans, but may improve a product such as tomatoes. Within the past few years additions of calcium to prevent softness or sloppiness and improve firmness of tomatoes has been practiced.

Hardness not only influences the flavor of beverages, but also the degree of carbonation, and in some instances color and clarity. The quality of casein, used in glues, paints, plastics and paper sizing, may be impaired by absorbed minerals mechanically bound during the washing of the casein.

Milk stone, or water stone, often develops in milk cans or vats as a result of improper can washing solutions and treatment. Temporary hardness, deposited onto metal containers, is known to be responsible for the spread of thermophylic and thermoduric bacteria. In one condensary, a gradual increase in minimum temperatures necessary to sterilize canned evaporated milk was traced to deposition of stone in cans during the can washing operations. With repeated treatments the resistance to heat of the organisms lodged in the stone was increased.

More obvious problems arise with faulty waters. Sulphur water, in addition to affecting water lines, will blacken

(Turn to page 85)

Research Laboratory To Develop New Foods On Pilot Plant Scale

By F. L. SEYMOUR-JONES

Director, New Products Laboratory,
Borden Co., New York

Purposeful direction of research to the development of new food products, with choice of projects based on needs of sales department and capacities of production department, marks a new forward step in applied food technology. The laboratory described in this article should interest all food manufacturers.

A DEVELOPMENT laboratory, complete with pilot plant equipment, in an office, not a loft, building in the heart of New York City is somewhat of a novelty. Such a laboratory, devoted entirely to research in the development of new products, has recently been installed by the Borden Company on the 17th floor of its office building at 45th St. and Madison Avenue.

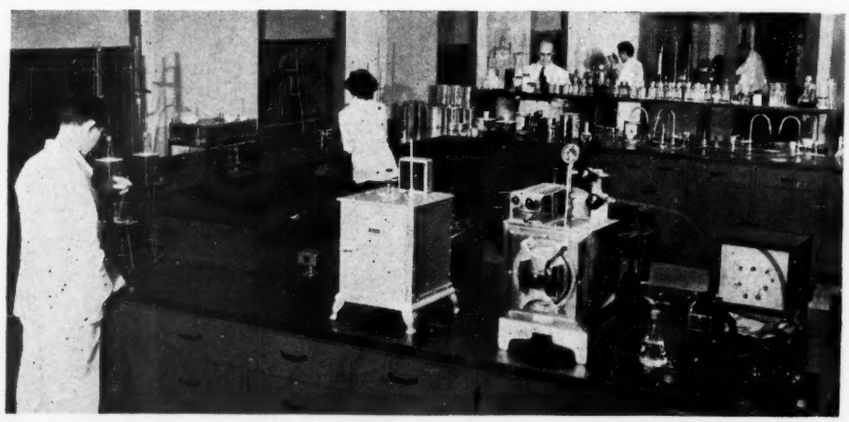
The company has other research laboratories, which cover the major divisions of operations and are at or adjacent to plants in various regions. There is scope, however, for a laboratory with time and opportunity to devote itself entirely to new product development. In this type of development work it is essential to maintain the closest contact throughout with the sales and production departments, with those men who will market and manufacture the finished product. Personal contact is vastly more enlightening than correspondence and there will, further, be much time saved in the examination of products. This justifies the relatively expensive rental of office building space.

Such a laboratory in an office building raises certain problems. While the company owns the building, many offices and a few entire floors are rented to tenants. Hence there can be no offensive noises, vibrations or odors.

The laboratory is on the seventeenth floor of a twenty-three story building, occupying the entire north side which furnishes excellent light. The main room has the chemical benches, balance and titration tables, and the pilot plant equipment. A separate room is devoted to bacteriological work. There is one store room for supplies (protected by six carbon tetrachloride ceiling type bulb fire extinguishers) and another for miscellaneous equipment, also furnished with lockers and used as a changing room.

The chemical and bacteriological benches and equipment are standard. The benches have soapstone tops with lead covered metal drawers and cupboards. No hoods are provided. It is felt that the amount of work requiring them will be small. Rather than run a duct up the outside wall to the roof to take care of fumes, arrangements were made to have another laboratory of the company in the city run such things as Kjeldahl digestions. Ordinary odors in the laboratory are removed through a duct by a 36 in. fan which discharges alongside the blank wall of the fire tower.

One problem faced was possible acid corrosion of the building plumbing by chemical wastes. The laboratory plumbing is lead but damages to the



General view of chemical and physical laboratory facilities, with bacteriological laboratory in background, at Borden's new products laboratory in New York City.

standard iron building plumbing rising through 17 stories could be serious and costly. Hence, a soapstone diluting tank, charged with marble chips, was installed below the sinks.

The pilot plant equipment is of standard makes but on a small scale. There is a 10 gal. jacketed stainless steel titlting kettle, which serves both as cooking kettle and as hot well for the pan. The vacuum pan is of stainless steel and 16 in. diameter, with a steam jacket divided so that batches can be finished as low as 7 gallons. Evaporation with both jacket sections on is 160 lb. of water an hour. Vacuum is obtained with a condenser and a 1 hp. vacuum pump. Provision is made for this to be used also for a vacuum drum dryer shortly to be installed.

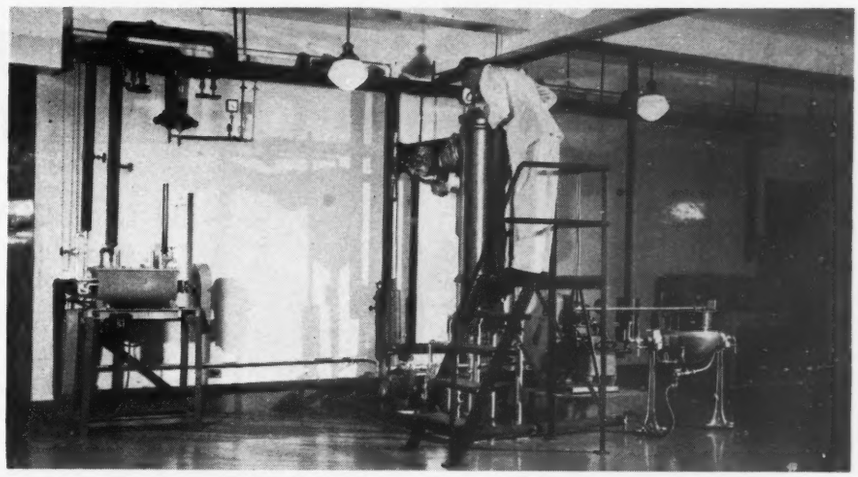
The homogenizer is a standard 50-gal. machine, geared down to 8-gal. capacity. The pilot sterilizer holds six cans, which can be reeled during processing. The ice cream freezer is 1-gal. size, while the two-hole hardening cabinet can be adjusted for temperature to —40 deg. F. if desired. An electric, two-can farm milk cooler serves as a cooling reservoir.

The stainless steel filter press has one square foot of filter surface and a capacity of from one-half to two gallons a minute. The hydraulic press is hand operated and produces pressures up to ten tons per square inch. A colloid mill is bench mounted. A mixer, with bowls of 12 and 20 qt. capacity and a variety of attachments, including a grinder, is a very flexible and useful implement. Platform scales are mounted on rubber tired wheels. Fortunately, orders for most of the equipment were placed in late spring before priority troubles became acute. Very little has been held up on this account.

Owing to floor load limits, the homogenizer is mounted on a concrete block. Otherwise the floor is covered with a rubber composition material laid in squares. The homogenizer, vacuum pump, kettle and colloid mill are mounted on vibration eliminators, while the mixer is mounted on springs. These have very successfully prevented complaints and have minimized noise and vibration.

All equipment needing drain or water connections is grouped around one of the four wet columns, one single drain above floor level serving all. A movable wash tank has a garden hose connection to the drain.

Steam is supplied through a 2-in. line brought up from the basement through a service column. Full pressure of 100 lb. or more is available as well as a line reduced to 15 pounds. Although the building is in a d.c. district, an a.c. line was brought to the laboratory, and electricity is available in 110 volt d.c., 110 volt single phase a.c. and 208 volt three phase. While the last voltage is unusual, at least it is 60 cycles, for one of the company's Brooklyn laboratories enjoys 25 cycle. New York City's electricity is still somewhat mixed.



Pilot plant scale equipment already installed at Borden's new products laboratory includes tilting jacket kettle, vacuum evaporator, homogenizer, filter press, hydraulic press, mixer, grinder, colloid mill, ice cream freezer and hardening cabinet. Vacuum drum dryer and other drying equipment will be shortly installed.

New experimental kitchen, adjacent to Borden's new products laboratory, besides working on recipes and advertising projects, tests out new products from the laboratory for household use.

Experimental Kitchen

Adjacent to the laboratory and on the same floor is the Food Service Department. This consists of an office, kitchen, pantry and air-conditioned dinette. The kitchen, while somewhat larger than that of the average home, is fitted up as an up-to-date household kitchen. Work benches and tables are of stainless steel, and one table is on rubber casters, so may be moved wherever wished. There is ample cupboard and drawer space, cupboards having a sloping top to avoid collection of dust. There is a double sink and a single vegetable sink, of stainless steel, with the usual hot and cold water and also a spray on a flexible hose for washing vegetables. A six-burner gas range with two ovens and broilers is used for cooking. Strip outlets provide plenty of connections to plug in electric equipment. A specially wired electric outlet is provided for photographic use and will save many blown fuses.

The functions of this department include the developing, testing and checking of recipes for all company products which may be used in booklets, in advertising, or on labels. It answers queries and requests from consumers. It prepares a monthly publication for home economists and contributes material regularly to house sales organs. Photography for booklets, advertising or store cards is carried out here. It supplies material for radio scripts, news papers and magazines. Close touch is maintained with home economists of other food companies. Last, but not least, it will test out such new products for household use as its neighboring laboratory may produce.

Purpose of Laboratory

The laboratory staff to start is small, with room for future expansion as justified. In their selection emphasis was laid on variety of experience in all branches of the food field. While all are technically trained and have had considerable laboratory experience, they have also had even more experience in development work, production, sales and costs. In other words, the choice has been food technologists rather than straight chemists or bacteriologists.

The selection of the type of work the laboratory will undertake is not fettered by any hard or fixed rules, but broad general principles have been laid down. In the first place, the potential market must be surveyed. This will eliminate products which would show inadequate volume or margin of profit, as well as morning glories—fads which pass in a few months.

There is no use wasting time and money to break into a very competitive, narrow margin field unless the new product shows decidedly better quality or much lower costs. There must be a green light from an economic standpoint before work starts.

The company has several well defined lines of distribution. Obviously, any new product should preferably fit into these, whether it be by retail milk wagon or grocery stores, rather than necessitate a new sales set-up. A product which can be produced on existing equipment or in an existing plant is also to be preferred. It is absolutely necessary to work with the responsible parties in the manufacturing department when the new product shows promise and before it is ready for production. This is probably the critical stage. Any chance of starting off on the wrong foot can be minimized by small scale commercial trials before going on to the general market.

Packaging is a very important element, both for the stand up qualities and production of the product as also for cost. The study of this is decidedly one of the laboratory's functions.

Ideas for products may come from various sources. Those which might be voted "most likely to succeed" would emanate from sales managers. They know their fields, what their customers will be likely to buy, what can be sold at minimum sales cost, and likewise they will know which items will require expensive missionary work.

Suggestions will also come from other parts of the organization, from the executives on down, including of course the laboratory personnel. These are all discussed and weighed, the final word lying with the Director of Research for the company, who is a vice-president. Ideas from outside the organization pass through a committee and those which have merit receive attention of sales executives before passing to the laboratory. Some caution is needed here as the idea may not be new to the company; it may have already been considered. We still receive "novel" suggestions for making caramels by boiling an unopened can of sweetened condensed milk, a process known since the earliest days of the company, eighty-four years ago.

Control of pH In Canning Acid Foods

By C. T. TOWNSEND

Laboratory for Research in the Canning Industries, University of California, and

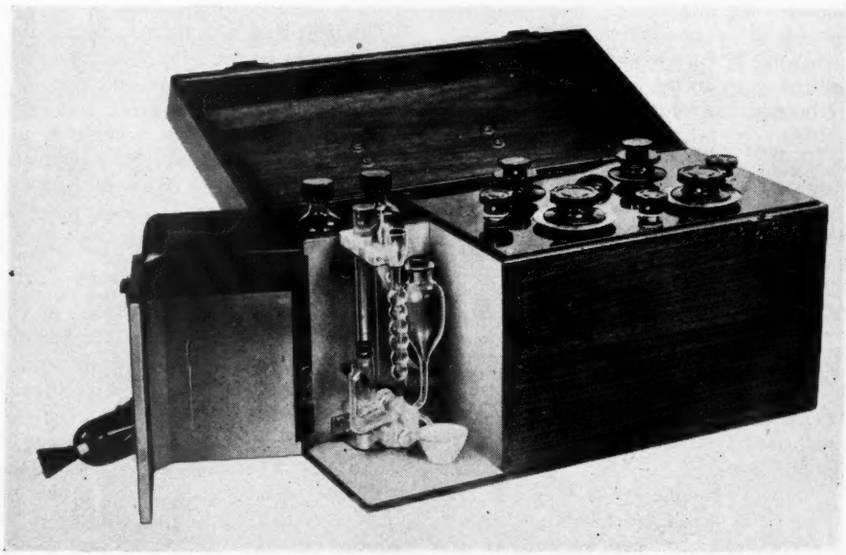
M. J. POWERS

Western Branch Laboratories, National Canners Association, San Francisco, Calif.

It is not desirable to process some canned products in a pressure cooker. And with these products the right degree of pH is essential to prevent spoilage. And some products, like the comparatively new vegetable juice cocktail, must have the pH carefully controlled. The author discusses the various aspects of pH control

STERILIZATION of canned foods is a function of time and temperature. This applies to acid foods as well as to those requiring pressure cooks. Most fruits vary in chemical composition and texture from year to year, and it is difficult, if not impossible, to work out adequate processes for each product. If fruit breaks down readily on heating, as occurs in some seasons, it has been the practice to modify the process in an attempt to strike as close a balance as possible between having a merchantable product and avoiding spoilage. In this connection an important factor to keep in mind is the pH of the product.

The introduction of reliable models of glass-electrode pH meters has made it possible for canners to obtain a fairly accurate control of the packing of products in which pH is an important factor in the process. Due to the increasing interest being shown in the packing of fruit and vegetable juices, and in the acidification of products low in acid in order to permit the use of a boiling-water process, it seems timely to point out some of the factors involved in the processing of acid foods and acidified vegetables. This is with particular reference, in the case of acidified vegetables, to the importance of keeping the pH below 4.5, the inhibiting



Glass-electrode pH meter, used for determining the pH value of foods. It has an overall accuracy of 0.02 pH, according to the manufacturer, the Cambridge Instrument Co., Inc.

point for the growth of *Clostridium botulinum*.

Acid products, owing to their low pH, are usually processed in boiling water. They may be divided into three main groups:

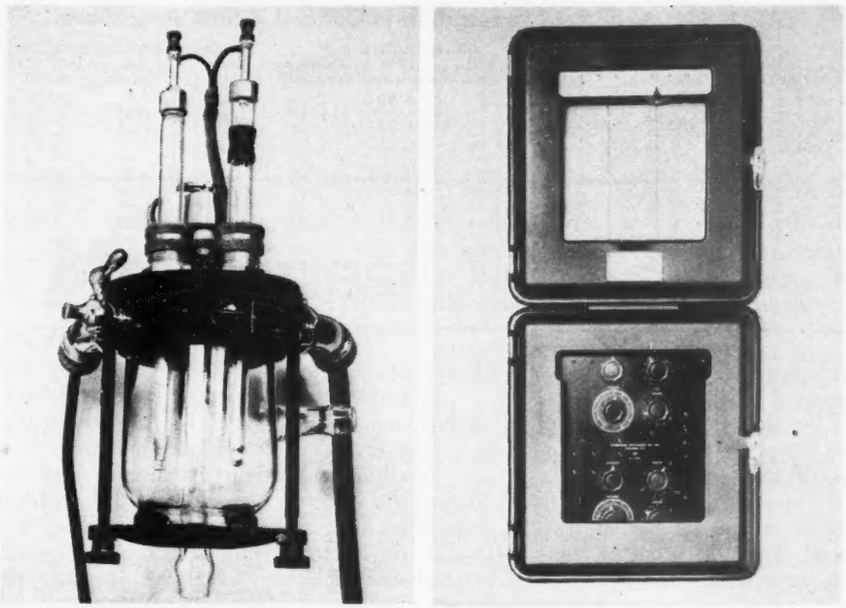
1. Those with a pH below 4.0. Examples of foods in this group are cherries, plums, berries, pickles and the citrus juices.

2. Those with a pH above 4.0, and which may exceed 4.5. They include pears, apricots, peaches, nectarines, pineapple, figs and tomatoes. The pH of some of these fruits varies over a wide range, dependent on locality, variety, maturity and climatic conditions, and may often be below 4.0. However, a sufficient amount of these fruits is received with a pH above 4.0 that, from a processing standpoint, they must be considered as belonging in the lower acid group. Fruit nectars are frequently somewhat low in acid, and require careful control in processing.

3. Foods acidified to a pH below 4.5. In this category are certain vegetables and vegetable juices which are susceptible to spoilage by *Clostridium botulinum* but which cannot withstand the pressure cooks necessary to sterilize them. Examples in this group are artichokes, onions, egg plant and such mixtures as potato salad, vegetable juice cocktail and antipasto.

In the first group (with a pH below 4.0) sterilization is a comparatively simple problem, as none of the significant spoilage microorganisms will survive more than a very few minutes at 170 deg. F. in such acid media. When encountered, spoilage may be due to yeasts or to various types of lactobacilli. With orange juice, it originally was common practice to fill the cans hot—about 170 to 180 deg. F.—then to close and water cool, the heat in the juice being relied upon to sterilize the lids. This practice has been found to result in considerable spoilage. A cook of at least two minutes in boiling water in an agitating cooker after the cans are closed is now recommended.

In the second group (pH above 4.0) the most significant spoilage microorganism in fruits in *Clostridium pasteurianum* (Townsend, 1938, and Spiegelberg, 1939), a spore-forming anaerobe producing butyric acid. The heat resistance is related to the number of spores present and to the pH of the medium. When spores are present in any considerable number in products with a pH above 4.3, it is not possible to destroy all of them without seriously damaging the foodstuff involved. If the pH is below 4.3 the heat resistance of the microorganism is very materially reduced, and at pH 4.1 destruction of spores is quite easily accomplished. Certain fruit juices and fruit nectars are particularly susceptible to this type of spoilage. Should the pH rise above 4.3 some spoilage is almost certain to occur, and losses may be heavy.



A glass-electrode pH recorder which provides a continuous record of pH. The sensitive element is shown on the left; the recorder, on the right. This instrument is made by Cambridge Instrument Co., Inc.

Packers of tomato juice have a very heat-resistant, spore-forming organism to contend with—*Bacillus thermoacidurans* (Berry 1933). It has a heat-resistance in tomato juice of about two hours at 212 deg. F. (20,000 spores); and if spores are present in appreciable numbers, cans require a pressure cook of some length to sterilize them. In most cases it is possible to control spoilage of this type by the elimination of sources of contamination in the manufacturing equipment.

Packers of pineapple juice set an upper pH limit for their product as a means of preventing butyric or thermophilic spoilage. Here again careful control of pH is very necessary if spoilage is to be avoided.

The pH of figs is probably higher than that of any other fruit canned in California, varying from about 4.8 to 5.1. Spoilage due to *Clostridium pasteurianum* has been encountered. Thermophilic spore-formers have also given trouble, the bacteria responsible for the spoilage having originated in contaminated sugar. Owing to the difficulty of sterilizing figs and the hazard of thermophilic spoilage, some canners acidify with citric acid to a pH below 4.5 to inhibit the growth of thermophilies even if the spores do survive the process.

Acidified Products

In the group of acidified vegetables and vegetable products there is a serious control problem. Extensive tests have shown that a pH of 4.5 will inhibit the growth of *Clostridium botulinum* in foods, and the California state regulations for the control of all acidified vegetable products are based on this figure. As an example of the difficulties involved in the safe processing of products of this kind, a detailed description of the control of the artichoke pack in California follows.

There are a number of different styles of artichoke packs—whole artichokes in brine, artichoke hearts in brine, artichoke bottoms in brine, artichoke hearts in oil and artichoke puree. Either citric acid or vinegar or a mixture of the two may be used for acidification, and the acid may be incorporated in a number of ways. In the brine pack the following procedures are used:

1. A blanch is not used, all the acid being incorporated in the brine. With this method, control of brining is important because of air in the product and variations in the moisture content.

2. A water blanch and acid brine. Somewhat less acid is needed here than where no blanch is given, owing to the loss of buffer constituents in blanching and the removal of entrapped air, permitting a greater fill of brine.

3. An acid blanch followed by an acid brine. In this case the time of blanching is very important. The strength of acid required in the brine

TABLE I—Rate of Acid Penetration in Canned Whole Artichokes.

Can size	Percent acid in added brine	Days of storage	Storage at 95 deg. F. pH brine	pH bottoms	Difference in pH	Storage at room temperature pH brine	pH bottoms	Difference in pH
No. 2-1/2.....	0.28	0	4.07	4.81	0.74	4.07	4.81	0.74
No. 2-1/2.....	0.28	5	4.20	4.52	0.32	4.17	4.57	0.40
No. 2-1/2.....	0.28	19	4.37	4.45	0.08	4.34	4.48	0.14
No. 2-1/2.....	0.28	30	4.48	4.52	0.04	....	....	...
No. 2-1/2.....	0.35	0	3.87	4.92	1.05	3.87	4.92	1.05
No. 2-1/2.....	0.35	5	4.05	4.40	0.35	3.98	4.48	0.50
No. 2-1/2.....	0.35	19	4.22	4.31	0.09	4.18	4.34	0.16
No. 2-1/2.....	0.35	30	4.24	4.31	0.07	*4.16	*4.24	0.08
No. 2.....	0.35	0	3.80	4.87	1.07	....	....	....
No. 2.....	0.35	5	4.05	4.41	0.36	....	....	....
No. 2.....	0.35	19	4.17	4.27	0.10	....	....	....

Each pH value is the average of four cans except those marked (*), for which only two cans were tested.

depends on the amount of acid incorporated in the blanch.

For the oil pack, all the acid necessary to bring the pH below 4.5 must be incorporated during the blanch.

The amount of acid necessary for a given weight of artichokes has been worked out for each of these methods of preparation under average conditions, but variations in growing conditions may occur which may necessitate considerable changes. For example, a different acid treatment is needed if the cells of the artichokes are turgid than if the moisture content is low, and it requires a longer blanch for acid to penetrate into large than into small hearts. Conditions may change during the season, necessitating a very close watch on the pack in each cannery.

A very careful technical control must be maintained at every step in the operations. All blanching and brining solutions must be titrated to an exact strength of acid. Since the amount of acid in the brine specified for any given condition is based on a definite fill for each size of can, the fill must be closely checked for every can. Where blanching solutions are used more than once, they must be fortified with acid to the proper strength each time. This is particularly true where vinegar is used, as acetic acid is volatile and is rapidly dissipated during boiling.

The control of inspected products which are processed in pressure cookers is a comparatively simple matter, since in most cases it involves only the checking of temperature records on charts and sometimes, also, obtaining a few initial temperatures. In the case of spinach, net and drained weights are taken to see if they are within proper limits. With artichokes and similarly acidified products, however, no such control is possible. When the inspection of artichokes first began in California in 1927, samples of blanching and brining solutions and of the finished product from each batch were submitted to the laboratory. Recently, for the brine pack, experienced inspectors were instructed in the technique of making titrations. It is now their duty to check the strength of blanching and brining solutions at intervals each day. Samples are sent to the laboratory only every third day of pack and then usually from only one batch as a check on the inspector's findings. Also, inspectors are required to obtain the fill weights on a certain number of cans of each size each day. Samples for the laboratory are still required from every lot of blanched hearts for the oil pack.

The control of the oil pack is more difficult than the brine pack, even though samples of blanched hearts are sent to the laboratory from every blanching. Hearts to be packed in oil are usually blanched in vinegar, then drained overnight and packed in oil the following day. The blanching solution is frequently used a number of times and the inspector has no check on the strength of acid or the length of each blanching. In most canneries the hearts are blanched in small lots only, to avoid crushing the product and to make handling easier. The result is a large number of small batches spread out on trays from which the inspector selects his samples. It is important that there be no additional trimming of the hearts after they are blanched, since the strongest acid is on the outer part of the butts and scraping them or removing the outer leaves decreases the acidity and raises the pH.

The Laboratory Problem

In the laboratory the problem arises as to what part of the product should be tested to give the significant pH value. In the brine packs, for some time after packing at least, the pH of the brine is considerably below that of the solids. This is particularly true in the case of whole artichokes, as can be seen in the Table I. The highest pH (lowest acidity) is found in the center of the butts and practical equilibrium may not be reached for several days.

In testing samples of artichoke hearts and bottoms in brine, the net and drained weights are first obtained. Then the brine and solids are put into an electric disintegrator where a pulp of uniform consistency is soon formed. The pH of the mixture is determined, the value being considered the approximate equilibrium pH for the can.

In testing blanched artichoke hearts to be subsequently packed in oil, the bottoms are cut off the hearts and crushed in a Carver laboratory hydraulic press at about 2,000 lb. pressure. The watery pulp which is squeezed out is used for pH determinations. Adding sufficient water to the bottoms to enable the use of the disintegrator may raise the pH. If this method of pulping is used and the pH is above 4.3, another sample should be tested, using the Carver press. In testing the finished product of artichoke hearts in oil, it has been found that putting the mixture into the disintegrator with a small amount of water results in a pulp which can be tested with the glass electrode in spite of the oil.

For whole artichokes in brine the butts are cut off and crushed in the press, as above, and the pH of the resulting pulp is determined.

Vegetable Juice Blends

Vegetable juice cocktail, a comparatively new product which is becoming increasingly popular, also requires control by pH measurements. It consists of approximately 75 percent tomato juice, with the balance composed of the juices of vegetables low in acid, such as celery, spinach and parsley. Since canners prefer not to add acid to control the pH, it is necessary for them to select tomatoes of sufficiently high acidity to compensate for the lack of acid in the other vegetable juices. A pH of 4.2 or below is usually necessary for this purpose. In California this cocktail must be packed under state supervision, and a sample of every batch of the finished product is submitted to the laboratory for checking before the goods can be released.

From time to time persons contemplate packing other acidified products, such as sauces, relishes, sea food cocktails, vegetable juices and the like, which, it is claimed, cannot withstand a pressure cook. However, without good control of acidity, such products might be dangerous to health. Therefore, to insure a safely packed product, the producer should be guided by the results of pH tests made at regular intervals.

References

C. T. Townsend, Spore-forming Anaerobes Causing Spoilage in Acid Canned Foods, *Food Research*, Vol. 4, 231-7, 1938.

C. H. Spiegelberg, Cl. *pasteurianum* Associated With Spoilage of An Acid Canned Fruit. *Food Research*, Vol. 5, 115-130, 1939.

R. N. Berry, Some New Meat-resistant, Acid-tolerant Organisms Causing Spoilage in Tomato Juice. *Journal of Bacteriology*, Vol. 25, 72-3, 1933.

Designs Own Machines To Speed Production

By MANDUS E. BRIDSTON
Port Blakely, Wash.

Forming, coating, cutting, washing and baking operations made highly efficient in Seattle bakery by ingenious applications of engineering to plant problems. There may be ideas here for you

MECHANIZED handling methods have been ingeniously applied to speed production and do the operations better at the wholesale bakery plant of Ruth Ashbrooke Co., Seattle, Wash. This company produces coffee cakes, cinnamon rolls, butterhorns and other types of sweet dough breads comprising a line of 30 varieties.

All of these improvements in plant operations were designed and built by L. C. Stiles, president of the company, and William Frederickson, plant superintendent, and they are covered by patents or patents pending.

Dough Sheeter

Outstanding among the machines developed and put to work in the Seattle bakery is a dough sheeter. This machine, fitted with a series of adjustable rollers, takes a 25-lb. batch of dough and converts it into thin sheets preparatory to shaping. The dough passes through the rollers on to a 20-ft. conveyor belt passing over and under a table to complete the circuit. A revolving brush, which stands poised above the belt, drops on the dough momentarily to remove surplus surface flour. This operation for "rolling out" dough into thin 20-ft. sheets requires just a few seconds and offers a distinct time advantage over rolling out with ordinary hand methods. Four 20-ft. tables on which to do hand rolling were required to turn out considerably less volume than is handled now on the one 20-ft. conveyor unit.

As the thin sheets of dough leave the mechanized "rolling out" conveyor unit, each individual sheet drops, neatly folded, into a large pan, and is readily lifted by hand to a second conveyor belt, operating in an opposite direction. Here mechanized operations, which are in line with the particular requirements of the variety, function with precision. The making of "bear claws," for example requires many intricate operations —cutting to shape, injecting filling, turning and cutting open the edges. And all these procedures are mechanized on the second conveyor-belt unit.

Compressed-Air Filler

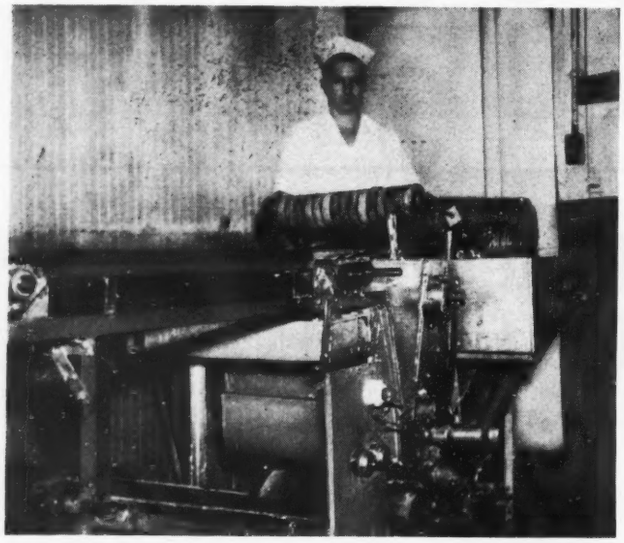
The first operation is the injection of fruit filling as the rolled dough traverses the second belt. This is achieved by means of a compressed-air tank mounted across the conveyor, with a separate interior receptacle containing the fruit filling. A 5-lb. air pressure forces the filling through nipples to the dough passing directly below. There are four such nipples, or nozzles, which permit the filling of "bear claws" in multiples of four. Next in line and attached to the filling unit, is a cross-shaft with five cutting disks which ride the conveyor belt and cut the dough into proper widths. Pressure on these revolving knives is maintained by spring attachments, so that the amount of pressure is adjustable.

Folding over the dough to inclose the filling is still done by hand, and then the folded dough passes under a device for cutting notches crosswise on the folded edges of the "bear claw." This job, done usually with a small hand tool, is mechanized by using a revolving cylinder mounted on a cross-shaft. The cylinder has four spaced wheels, the rims of which are fixtured with inch-wide cutting edges at right angles to the cylinder shaft.

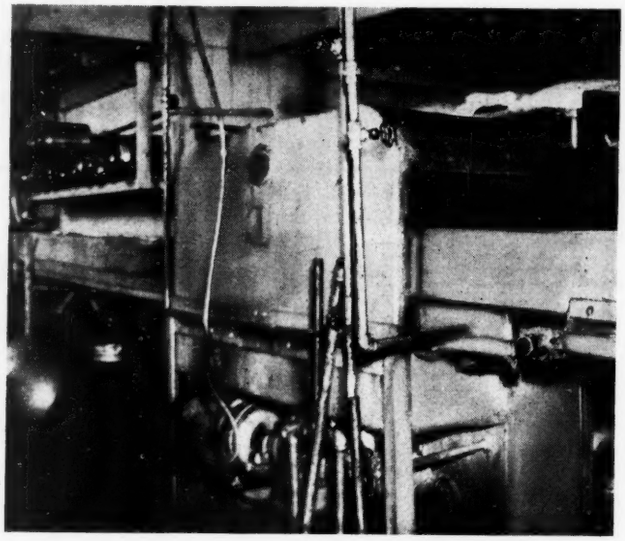
Adjustable Cutter

After this operation, the folded dough passes under a cutoff knife which cuts pieces to any desired length. To achieve this flexibility required a great deal of inventive thinking and application. Though the speed of the conveyor belt is variable, it was found more practical to achieve this variation in lengths of dough by regulating the speed of the cutting knife. This cutoff knife, extending crosswise of the conveyor, moves up and down, actuated by driveshafts on eccentric gears. The eccentrics are chain driven from another gear shaft, movable on a horizontal plane. The secondary gear shaft is fixtured with a series of gears of varying sizes to provide the different speeds of the cutoff knife. When it is necessary to slow down the knife action, the chain

In a matter of seconds this machine converts a 25-lb. batch of dough into a 20-ft. sheet.



Icing machine designed and built by Ruth Ashbrooke Bakeries, Seattle. The man is Wm. Frederickson, the inventor. A conveyor moves the cakes over an icing-covered revolving drum.



Pan washing is made easy at Ruth Ashbrooke Bakeries by this machine. Inverted pans are stacked on feed table at right and are automatically fed into the washer one at a time.

is transferred to a larger drive gear. This is accomplished by moving the drive-gear shaft forward so as to loosen the chain, accomplishing the operation with a manually operated hand lever.

Mechanical Topping

Passing along the conveyor belt, the completed cakes are fed onto a revolving circular table containing struessel, a mixture of minced nuts, sugar and other ingredients. The cakes fall to the table in an inverted position and are automatically coated with the topping. This table is 7½ ft. in diameter, and not only revolves but also moves away from the conveyor on a horizontal plane. Centering the table is an elevated shelf with a supplementary supply of struessel. The operators stand around the table, panning the finished articles as they drop.

A real problem in connection with the operation of this production line was solved by flour-dusting the conveyor belt to prevent stickiness, either from dough or fruit filling. Gravity dusting from above is conventional, but was impossible here. After some experimentation, dusting the conveyor belt from below on the return circuit proved entirely satisfactory. Directly below the under side of the belt was mounted a half-round bin or drum crosswise of the belt. Dusting flour is poured into this bin through a spout on the side, and a revolving agitator feeds this flour to an overhead revolving brush, which in turn brushes the flour directly to the belt surface.

With some types of cake passing through this conveyor system, it is necessary to wash the top surface to make the struessel properly adhere. This is done with an automatic spray-gun attachment which sprays the "wash" directly onto the cakes before they are inverted on the struessel table.

Production on this line varies, of course, with the type of sweet dough bread in the run. On butterhorns, a time test showed that four men operators turned out 175 dozen of the cakes in 15 minutes. Five men on the line turned out 1,200 dozen cinnamon rolls in an hour. Generally speaking, half the number of man hours turns out twice the volume of product, as compared to old handwork methods.

Revolving Drum Icer

After baking there still remains the job of icing the "bear claws," and this operation, too, is traditionally a handwork job. But the mechanization put to work in this instance utilizes the conveyor principle. Pans of cakes are inverted on a conveyor belt which passes them over a revolving drum completely covered with warm icing of a uniform consistency. They are then fed right-side-up to waiting pans, all iced without being touched by human hands.

This drum revolves within a tank filled with icing to the proper level. The icing is kept at a proper temperature by means of a hot-water jacket, thermostatically controlled, and uniform consistency is maintained by an agitator and baffle within the tank.

Conveying away the iced cakes from the icing drum proved to be a knotty problem. A solid canvas belt could not function in the icing bath. Even the regulation type of chain belt did not answer the purpose, for the problem was to keep the surface of the belt almost entirely free of icing. The answer was found in an entirely new type of chain belt made up of thin metal sheets riveted together as links operating edgewise in grooves machined in the all-metal icing drum. The end roller of this conveyor belt is likewise grooved.

The grooves on the master drum (revolving in the icing bath) are deep enough to bury the conveyor chain flush with the outer face, thus providing a smooth icing surface. The end roller, also of metal, is only slightly grooved, so that one half of the chain protrudes to keep the iced top surface of the cake away from the roller face.

As the cakes pass over the icing drum they are gently pressed downward by means of a series of wooden rollers on a shaft, the center holes of these rollers being larger than the shaft to give variation in pressure surface. Thus all the cakes, despite slight variations in thickness, receive uniform icing. Surplus icing drips into the icing bath, directly below the chain conveyor.

With this machine it is possible to ice 2,280 half-dozen-lot packages of coffee cakes per hour, and the work is done with more neatness and uniformity than with the usual hand method.

Pan Washing Made Easy

The chain principle of movement is also applied to pan washing in this plant. A stack of inverted pans is placed upon the feeding table, and as the belt moves under these pans, two cogs or "dogs," spaced at intervals on the belt pick up the lower pan and move it forward on the conveyor to the washing tank. At the washer a series of jets brings live steam under pressure to the entire surface of the pans. Next, hot-water jets do a spray and rinse job,

after which the conveyor neatly stacks the pans on a table at the end of the line. This ingenious time and drudgery saver was also designed and fabricated in the plant.

Ovens Revamped

In the early days, the laborious job of "peeling" pans into and out of the hot brick ovens and the high cost of electricity or gas for heating the revolving ovens led Mr. Stiles to try an experiment. He reduced the giant, two-story, revolving ovens of the cracker companies—ovens heated directly by oil—to the small confines of an ordinary bakery. Inside a sheet-iron compartment 10 ft. square and about 8 ft. high were installed revolving shelves made from angle iron. And at the floor level was installed an oil burner with a cleverly constructed "open" firebox. There were ten such shelves accommodating 30 pans. The oven performed excellently, and though the oil burner has now been changed to the new "Vap-O-Fier," the system of the old oven is still doing yeoman service at this plant. In fact, two such ovens are now functioning, and the gas used in the new ovens is generated in the plant from stove oil by means of the Vap-O-Fier.

Practical ingenuity, such as manifested in this plant in designing equipment to do better work more quickly, would go a long way in solving the production problems of a great many plants. In particular, the conveyor-belt applications worked out here to speed the production of coffee cakes lend themselves to a wide variety of food products.

What's Known Today About Dehydrating Vegetables

By W. V. CRUESS

Professor of Fruit Technology and Chemist in the Agricultural Experiment Station, University of California, Berkeley, Calif., and

E. M. MRAK

Assistant Professor in Fruit Products and Assistant Mycologist in the Agricultural Experiment Station, University of California.

PART I—This begins a series of articles* that will give you a wealth of up-to-date and authentic information on vegetable dehydration. Vegetable drying, not yet very important commercially, is likely to be boosted to prominence by the demands of the emergency

DEHYDRATED vegetables should refresh well. That is, upon soaking a few hours in water, the pieces should absorb water and return to practicaly their original size, form and appearance. They should cook tender and not remain tough; should not collapse and become mushy; and should retain a considerable proportion of their original odor and flavor. Also, they should be sufficiently dry that they will not undergo serious deterioration in flavor and odor during storage. They should retain a large proportion of the vitamin and mineral content of the fresh vegetables. They should be packed in containers that will exclude insects and prevent undue absorption of moisture. Finally, they should be "bone dry," i.e., so low in moisture content that they will not undergo undesirable changes in storage.

Vegetables to be used for dehydration should be garden fresh and in most cases should be dried on the same day they are harvested. Pumpkin, potatoes and sweet potatoes, of course, may be stored for a reasonable length of time before use. Only vegetables of the best varieties, of the proper maturity, cooking quality, best color and appearance should be used.

Advantages and Disadvantages

Dried vegetables have only one-fifteenth to one-fifth the weight of the fresh vegetables as picked. The bulk, particularly if the dehydrated products are compressed before packaging, is much less than that of the products when fresh or canned.

Table I, as published by Prescott and Sweet,[1] shows these relationships. It is apparent that when transportation facilities or storage space are limited, the use of the dehydrated products would be advantageous.

Some dehydrated vegetables are equal or superior in color to the canned products, as, for example, is the case with peas, string beans, carrots and dehydrated spinach (if the last named has not been stored too long). On the other hand, dehydrated vegetables at their best after cooking are usually not equal in flavor, texture, appearance and aroma to cooked fresh vegetables. Their daily use as a principal part of the menu might make the diet monotonous and might lead to a mounting dislike of these products. If properly prepared and seasoned and not served too frequently they are very satisfactory.

The relative values, exclusive of the vitamins and minerals, of several vegetables, fresh and dehydrated, are indicated in Table II, also taken from Prescott and Sweet.[2] These values indicate the degree of concentration involved in dehydration. In actual practice, dehydrated vegetables are usually "refreshed" in water before cooking and are served with about the same water content as cooked fresh vegetables.

The relative vitamin content of fresh and dehydrated vegetables has not been fully determined. However, some data

TABLE I—Comparison of Weights of Dehydrated and Canned Vegetables.

(From one ton of fresh)

Vegetable	Weight prepared for canning or dehydration, pounds	Weight canned and packed, pounds	Weight dehydrated and packed, pounds
Corn	750	1,426	465
Peas	1,960	4,291	350
String beans	1,500	3,832	200
Lima beans	800	2,300	250
Tomatoes	1,100	1,763	125
Pumpkin	1,400	2,146	200
Sweet potatoes	1,450	2,259	513
Cabbage	1,450	2,400	215

* The ensuing series of articles on the dehydration of vegetables is largely a compilation of information existing at the time of preparation of the manuscript. Current and future research will undoubtedly make necessary rather radical changes in the methods described in these articles.

have been reported, and one might, also, make certain deductions by analogy from information published on vitamin loss and retention in the drying of fruits.

The water-soluble vitamins found in vegetables are C and those of the B complex. Carrots and leafy vegetables are rich in carotene, the precursor of vitamin A. Vitamin C prevents scurvy and is called the antiscorbutic vitamin; it is abundant in leafy vegetables, tomatoes, string beans, asparagus and peppers. The vitamins of the B group prevent beri beri, promote growth, prevent pellagra and are beneficial in other ways. Most vegetables are fair to good sources of the B group. The members best known at present are B_1 (thiamin), G (riboflavin) and nicotinic acid; although there are several others of importance. Considerable amounts of water-soluble vitamins are lost during the blanching of fresh vegetables in water for canning or drying by dissolving in the blanch water. For drying, steam blanching, therefore, should be used. The water in which dried vegetables are soaked and cooked will contain much of the water-soluble vitamin content of the product and should not be discarded.

In the drying of unblanched vegetables, most of the vitamin C is lost, according to Fellers[3] and also King and Tressler,[4] who quote several papers by others on this subject. Investigations in our laboratory show that blanching minimizes this loss to a great extent. It is known that treatment of fresh fruits in the fumes of burning sulphur retains most of the vitamin C. However, sulphuring is not advised for vegetables, with the possible exception of tomatoes. Feller[3] states that vitamin A is fairly well retained. It decreases in storage in air. Mackinney of this laboratory confirms that statement. Vitamin B_1 is well retained in the sun drying and dehydration of fruits except where sulphur is used, since sulphur dioxide destroys it. Morgan[5] found that most of the B_1 was retained in drying the globe artichoke. Riboflavin, one of the B group, is well retained in dried milk; but its retention in the drying of vegtables is not definitely known. It is a very stable vitamin; hence is probably well retained.

Nicotinic acid, another member of the B group, is apparently stable to heat, since foods rich in nicotinic acid still prevent pellagra after cooking, e.g., turnip greens, lean meat, and so forth.

Harris *et al*[6] have stated that losses in B_1 are probably small if the products are dehydrated rapidly under properly controlled conditions.

Adaptability to Dehydration

Asparagus is satisfactory if only the tips are dried. Tomatoes retain their color and flavor fairly well, but fail to return to their original form and size on soaking in water. Dehydrated spinach and chard are apt to be lacking in flavor. Dried globe artichokes do not refresh well and are insipid in flavor. The dehydrated Jerusalem artichoke (a tuber), however, is very satisfactory. Most other vegetables, if properly prepared, respond very well to dehydration.

Nevertheless, as in canning, different varieties of the same species differ considerably in their suitability for dehydration.

Caldwell, Moon and Culpepper[7] compared the suitability for dehydration of 40 varieties and also of a number of sub-varieties of sweet potatoes over a period of several years. They reported that Nancy Hall, Myers, Early, Mullihan and Mameyita were somewhat superior in quality of dried product to all others.

Sun Drying vs. Dehydration

In 1917 to 1920 a number of experiments were conducted at the College of Agriculture at Davis by one of the authors.[8] In this work, among other things a comparison of the relative suitability of sun drying and the dehydration of vegetables was made. In all cases the dehydrated products were much superior to the sun dried in color, flavor and cooking quality. The sun's rays have very adverse effects on color, flavor and vitamin A. The sun-dried products were scarcely edible. Sun drying of vegetables is not recommended.

Location of Plant

Since vegetables for dehydration should be dried while fresh from the garden, it is advisable to locate the plant in or near an important vegetable-producing section. A long growing season is to be preferred in order to spread the fixed charges. On the other hand, if the cost of production of vegetable is low, the handicap of a short growing season might be overcome by the lower cost of raw materials.

The availability of experienced labor in the handling, processing and picking of fresh fruits and vegetables is also a primary consideration. Consequently, location near a fruit and vegetable growing and canning center is desirable.

Preparation for Drying

The principal operations involved in the preparation of vegetables for drying are: (1) Washing; (2) sorting; (3) trimming; (4) preparation for blanching; (5) blanching and (6) traying.

Washing

Since vegetables for dehydration should be blanched in steam rather than in boiling water, it is evident that thorough washing is required. The standard equipment used for washing vegetables for canning is suitable for washing vegetables for dehydration and is readily available from manufacturers of canning equipment.

Root vegetables and tomatoes can be washed satisfactorily in a rotary drum washer fitted with spray nozzles which supply forceful streams of water under high pressure (50 lb. or more per square inch) and in ample volume.

Spinach is usually passed through a long shallow tank of running water in which paddles move it forward and air bubbles agitate it. Sand and small insects are thereby loosened and then are more easily removed during the following washing under sprays in a drum washer.

Peeling

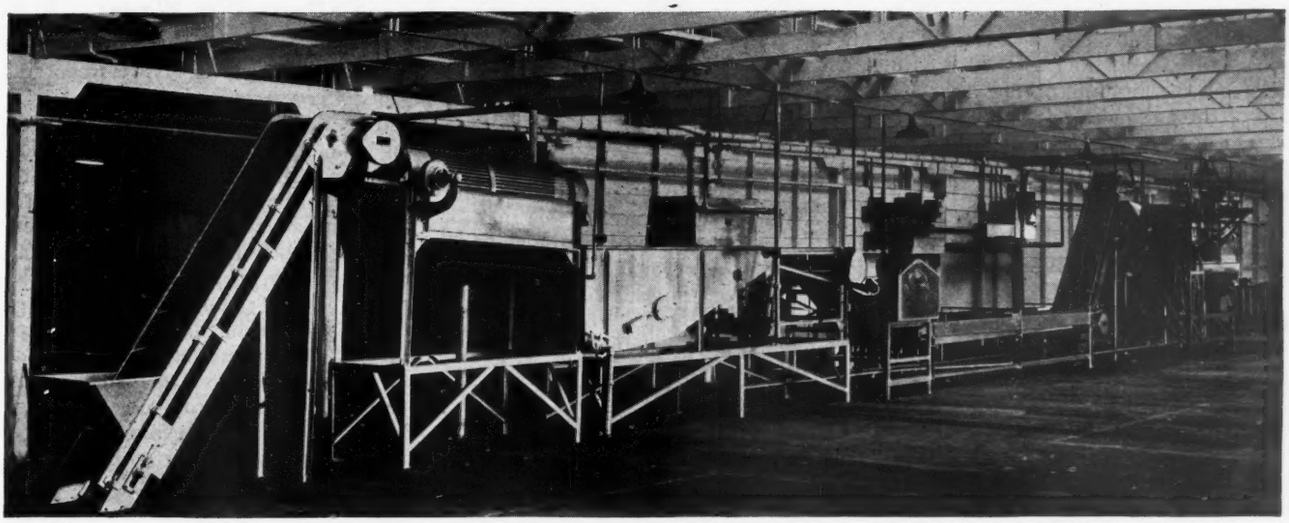
Root vegetables and tomatoes should be peeled before drying, unless the tomatoes are to be powdered.

Tomatoes are scalded in live steam or in boiling water long enough to cause the skins to crack and slip, usually about one-half minute. They are then chilled in sprays of cold water and are peeled by hand. For canning, the tomatoes are cored deeply with a special knife, but for dehydration the coring should be rather shallow in order to

TABLE II—Relative Food Values of Several Fresh and Dehydrated Vegetables.

(The dehydrated calculated to 10 percent moisture basis)

Vegetable	Percent water	Percent protein	Percent total carbohydrates	Fuel value per pound, calories	Ratio of fuel value of fresh to dehydrated (approximate)
Cabbage, fresh, edible portion	91.5	1.6	5.6	145	.....
Cabbage, dried	10.0	16.9	59.3	1,536	1:10.6
Corn, green, edible portion	75.4	3.1	19.7	470	.....
Corn, dried	10.0	11.3	72.1	1,720	1:3.7
Peas, green, edible portion	74.6	7.0	16.9	385	.....
Peas, dried	10.0	24.8	59.8	1,646	1:3.5
Potatoes, fresh, edible portion	78.3	2.2	18.4	385	.....
Potatoes, dried	10.0	9.1	76.4	1,598	1:4.1
Pumpkin, fresh, edible portion	93.1	1.0	5.2	120	.....
Pumpkin, dried	10.0	13.0	67.8	1,565	1:12.0



The equipment used in preparing vegetables for drying is like that used by the canner. Here is a line of new equipment installed in the new plant of Dry-Pack Corp. at San Jose, Calif. It includes washer, cleaner, peeler, inspection table, blancher, tray loader.

avoid excessive loss of juice and breakage.

Most root vegetables such as potatoes, carrots, parsnips and sweet potatoes are usually peeled by a mechanical peeler that removes the peel by a rasping action. It consists of an upright, metal cylinder with revolving bottom. The inner surfaces of the walls and bottom are covered with corundum or other crystalline abrasive material cemented to the metal. The tubers or root vegetables are introduced at the top and the bottom is rotated rapidly. The skins are rasped off by contact against the rough surfaces of the walls and bottom. Sprays of water wash away the grated peels. The peeled vegetables are removed through a side door. The peeler is operated on the batch basis rather than continuously, although it is not necessary to stop the motor and rotor during loading or emptying. The gratings from potatoes contain a great deal of starch which can be recovered by settling. The vegetables require considerable trimming by hand after treatment in the machine.

Beets can be peeled in the mechanical peeler or as for canning, that is by heating in steam until the skins will slip easily. They are then cooled and peeled and trimmed by hand. The steaming cooks them, hence additional blanching is unnecessary. Sweet potatoes may be peeled in the same manner or peeled as described for white potatoes.

Carrots and sweet potatoes may be peeled in a boiling lye solution in the equipment commonly used for lye peeling of peaches and apricots. For carrots a dilute solution of lye (about 2 to 3 percent sodium hydroxide) is satisfactory; but for sweet potatoes the peeling solution must contain about 10 percent of lye. The peeling operations consist of mechanically agitating in, and conveying the vegetables through, a tank of boiling lye, or spraying them on a metallic door matting conveyor with sprays of boiling lye, followed in either case by washing the loosened and disintegrated peels and lye from the vegetables by forceful sprays of water. The drum washer is recommended for root vegetables, as it gives a very energetic washing. The peeled products require sorting and hand trimming.

Subdividing

In order to facilitate drying, and to make a product of distinctive appearance, tubers and root vegetables are sliced, cubed (diced), shredded or riced.

Slicers are of various designs. In some the knives are stationary and the vegetables are forced against them, in others the knives move. Hand-operated as well as power-driven slicers are available. The slicers used for slicing peeled, cored apples and the kraut slicer used for cabbage are satisfactory for slicing root vegetables. The slicers are adjustable to give slices of any desirable thickness. Thick slices require a longer blanch in steam, dry more slowly and refresh and cook more slowly than thin slices. Thin slices are more apt to "mat down" on the trays and impede drying unless extra care is taken in spreading them on the trays.

By shredding is meant cutting with special knives or graters, hand operated or mechanical, into small "shoe peg" pieces. These dry rapidly, refresh quickly, cook more rapidly than slices.

Dicing or cubing is a favorite method of preparing carrots, beets, turnips and potatoes for drying. In the machines used during the 1917–1925 period, the vegetables were first sliced through a horizontal plane and then the slices were forced downward through a stationary grating by plungers operating vertically. In modern canneries, in dicing peaches and pears for fruit cocktail the fruit is first sliced into flat slices, then sliced into "french fry" pieces and these are cut crosswise to give dice-shaped pieces. Where large volume is to be handled, perhaps the peach and pear dicing machines would prove useful for vegetables.

Trays and Traying

In order to permit easy handling and even drying of the product, dehydrator trays for vegetables should be only about 2½ to 3 ft. in width and about 3 ft. in length. The usual drying tunnel is about 6½ ft. wide and accommodates two stacks of 3-ft. trays.

The frames are of pine, and for vegetables the bottoms are of screen of about ⅛-in. mesh. For nonacid vegetables, galvanized screen has been used. But Monel metal screens are preferable since they are more resistant to corrosion. For acid vegetables such as rhubarb and tomatoes, it is important that the Monel metal or the wood slat trays be employed. The disadvantage of Monel metal is its high cost, and that of wood is the fact that it cannot be used for blanching the vegetables in steam. If used for tomatoes, the slats of the wooden trays should be coated generously with confectioner's slab oil (an edible mineral oil) in order to minimize sticking of the dried product.

The sides of the trays should be high enough and the ends low enough to provide an air channel of at least 2 in. between the bottom of one tray and top of the one beneath it. The frames should be sturdy and the bottoms should be reinforced with cross strips in order to prevent sagging of the centers of the trays.

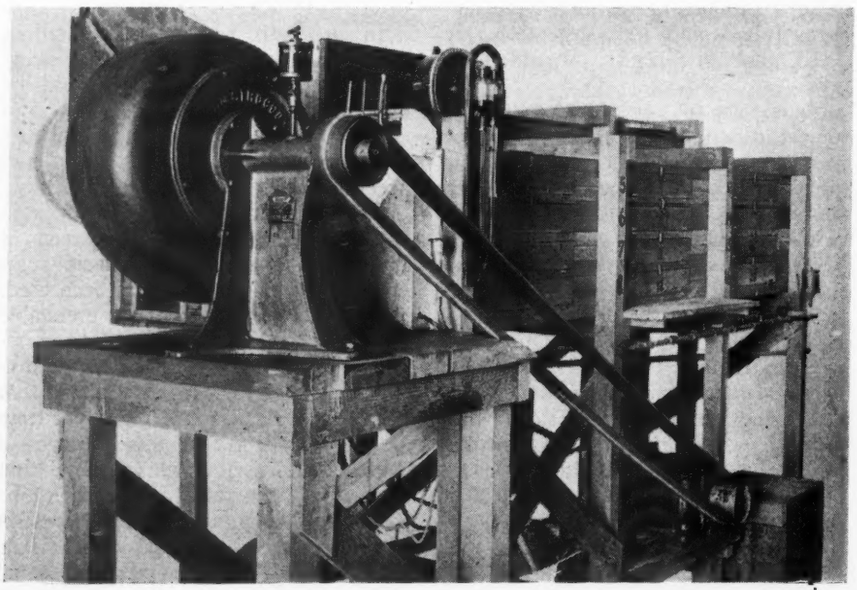
Blanching

Blanching, or scalding, has for its purposes the inactivation by heat of enzymes responsible for undesirable changes in color, odor and texture and loss of vitamins during drying and subsequent storage; and, secondly, partial precooking in order that the dehydrated vegetables will refresh in water rapidly and cook quickly. In the early days of vegetable drying, the products were dried raw without blanching. Consequently they often were very tough and usually were very deficient in flavor or possessed off flavors and odors. Blanching is necessary in most cases, if satisfactory dehydrated products are desired for replacing the fresh or canned. The exceptions are onions and garlic dehydrated for powdering, and red peppers. Dried onions and garlic keep better if blanched before drying. Even dried peppers refresh more satisfactorily if steam blanched before drying.

Blanching is conducted in hot water at or near the boiling point or in live steam at about 212 deg. F. The hot water blanch is undesirable, because it dissolves much of the valuable mineral substances and the water-soluble vitamins. Magoon and Culpepper[9] made a careful comparison of the blanching of vegetables in steam and in boiling water. They found losses of 1½ to 30 percent of the water-soluble constituents in water blanching, but very little loss in live steam. The loss is particularly heavy with spinach and is light with peas and string beans. Blanching in dilute soda (soda bicarbonate) solution is even more objectionable than in water and is not to be recommended.

The trays of vegetables may be placed on angle-iron runways in a steaming cabinet and subjected to live steam for a predetermined length of time. Great care must be taken to see that the trays are far enough apart and the steam supply so abundant that vegetables on all parts of all trays receive ample and uniform steaming. Truck loads of trays can be steamed at one time, but heating is very apt to be nonuniform. Also, the trays may be passed mechanically by conveyor through a metal box filled with live steam from steam jets. Such a device makes for efficiency and large capacity. Or the prepared vegetables may be steamed on a woven-wire conveyor passing continuously through a steam box; the blanched, scalding hot vegetables drop on to trays at the outlet end. Wooden, slat-bottom trays can be used to receive the blanched vegetables from the conveyor.

In hot-water blanching, the prepared vegetables are placed in baskets and immersed in a vat of boiling water for the required period and then spread on trays; or they may be carried through a tank of boiling water by a special conveyor of the traveling perforated-bucket type, or by the rotating drum blancher such as used for peas.



Small experimental dehydrater used at the University of California. The air velocity, temperature and humidity can be controlled within narrow limits.

Disposal of Wastes

In the trimming of such vegetables as spinach, cabbage, celery, carrots and beets, the vining and shelling of peas and the husking of corn, and the peeling and coring of tomatoes, considerable quantities of waste leaves, butts and peelings accumulate. These wastes are useful as feed for livestock, particularly for hogs and cattle, if fed with concentrates or a good grade of hay. The wastes, except tomato, can be dehydrated in rotating drum driers heated by direct heat, although the yields are so low and fuel costs so high for most vegetable wastes because of their high moisture content that the dried products are apt to be too costly for livestock feeding.

Corn husks and pea vines and pods can be dried in the sun at little expense, or placed in silos. Pea vines, however, should be mixed with sorghum or corn when used in silage in order to prevent putrefaction.

Where it is impracticable to use the wastes for livestock they may be spread on the soil and plowed under. In such case they should not be spread too deep, or they will "poison" the soil.

Part II, covering dehydraters and principles of dehydration, will be published in February—THE EDITORS.

References

1. S. C. Prescott and L. D. Sweet, Commercial Dehydration; A Factor in the Solution of the International Food Problem, *Annals of American Academy of Political Science*, Vol. 83 (172), 48–69, 1919.
2. See Footnote 1.
3. C. R. Fellers, The Effect of Processing on Vitamins in Fruits and Vegetables; A Review, Massachusets Agricultural Experiment Station *Bulletin* 338, 1–23, 1936; Vitamin C Content of Spinach, *Proceedings of the Society of Horticultural Science*, Vol. 38, 500–54, 1938.
4. C. G. King and D. K. Tressler, Effect of Processing on the Vitamin C Content of Foods, *Proceedings of the Institute of Food Technologists*, 123–132, 1940.
5. A. F. Morgan, Changes in Vitamins A and B of the Globe Artichoke Due to Various Canning and Drying Processes, *American Journal of Physiology*, Vol. 68, 481–508.
6. R. S. Harris, B. E. Proctor, S. Goldblatt and J. Brady, Effect of Processing on the Vitamin B Content of Foods, *Proceedings of the Institute of Food Technologists* 109–121, 1940.
7. J. S. Caldwell, H. H. Moon and C. W. Culpepper, A Comparative Study of Suitability for Drying Purposes of Forty Varieties of Sweet Potatoes, U. S. Department of Agriculture *Circular* 499, 1–51, 1938.
8. W. V. Cruess, The Evaporation of Vegetables, California State Department of Agriculture Monthly *Bulletin* 8 (3), 94–101. 1919.
9. C. A. Magoon and C. W. Culpepper, Scalding of Vegetables for Canning, U. S. Department of Agriculture *Bulletin* 1265, 1–48, 1924.

How To Sulphur Fruit For Great Britain

Hot sulphuring process, not permitted for use with products for sale in the United States, gives fruit processors a method of preserving surplus crops that is acceptable to Great Britain and inexpensive to carry out. Arrangements should be made this winter so that this process can be put to use with 1942 fruit crops

LEASE-LEND demands for food shipments to Great Britain make it imperative that perishable foodstuffs produced in the United States be preserved to the fullest possible extent. Just as eggs and milk are now being dried, and meats and fish are being canned and cured, so must perishable fruits and vegetables produced during the crop season of 1942 be processed in a manner that permits them to be stored and shipped overseas.

Along these lines, the Agricultural Marketing Service has recently released directions for an emergency method of preserving fruits for shipment to England, known as "hot process sulphur dioxide preservation." It is not permissible for use in processing fruit for the domestic market, as such sulphured fruits cannot be sold in the United States. Tommie's tummies, however, must be tougher (or something) than the home-grown brand, for Great Britain permits the importation and use of these sulphured products, with no apparent ill effects.

The objects of this process are to sterilize the fruit by treatment with steam; to render it sufficiently fluid and permeable to permit substantially uniform distribution of the sulphur dioxide solution; and to add sufficient sulphur dioxide to prevent reinfection from air borne spoilage organisms. The AMS method follows:

Equipment Needed

The most suitable equipment for this process comprises cylindrical tanks or vats of stainless steel or nickel in which to carry out the pulping of the fruit. Cypress or fir tanks may be used, but are less desirable. These tanks should be of 500 gal. to 1,000 gal. working capacity.

Bottoms of these tanks should be dished or cone-shaped, to allow complete draining and should be equipped with 3 in. discharge valves of the gate or "sanitary" type. A plug or stopper is desirable to prevent uncooked fruit from lodging in the short section of pipe above the valve. Each tank should be equipped with a lid or cover—hinged or removable—and should also have a 6-in. vent to the atmosphere.

For heating, a live-steam line, ending 4½ in. above the tank bottom, and placed off-center, so as not to interfere with access to the discharge, is installed in each tank. These open-ended steam lines end in a "cross," having curved ends. Thus the live steam imparts a rotary movement to the fruit, until such time as agitation is provided by currents set up by boiling. This steam line, within the tank, should be of stainless steel, or copper if stainless is unobtainable, but never of steel, iron or galvanized iron. To avoid unnecessary dilution, the steam line should be taken off from the top of the main, and drips, traps or separators provided to give steam that is as dry as possible. About 75 boiler horsepower should be available for each 500 gal. of tank capacity that will be in operation at any one time.

A mixing tank is desirable but not absolutely essential. If used, it releases the pulping equipment promptly for the next batch, permits easy standardization and enables the mixing of two or more batches to give greater uniformity. This mixing tank should be trough-shaped or rectangular to allow easy mixing and should be sloped to the discharge valve to allow easy draining. It should be made of stainless steel, cypress or fir. A 3-in. gate valve and filling elbow should be provided for ease in filling containers.

Alternate Equipment

Smaller tanks than 500 gal. can be used for pulping. Even barrels are usable in emergencies. If barrels are used, they should be mounted on a wheeled truck or skid, and the steam line should be connected with easily demountable unions to permit the barrels to be moved to the mixing tank.

Barrels can also be mounted on a platform and equipped with plugs or valves discharging into a trough running into the mixing tank. A third method of using barrels is to mount them on trunnions so that they can be dumped.

Jacketed kettles of stainless steel, nickel or tinned copper can also be used for pulping. These, however, are less desirable than the tanks, because they are slower and generally require continued stirring with a paddle.

Tomato products cooking tanks with closed coils, as used in catsup manufacture, can also be used for this method of fruit preservation. However, with them there is danger of burning the product on the coil and also there are "dead" spots under the coils or at the outlet where fruit can remain uncooked. When using such a cooker for the pulping operation, it is best to remove the coils and install the type of live steam inlet already described. If this cannot be done, it is suggested that a small auxiliary "cross" be installed, discharging just above the bottom of the tank. This will prevent the occurrence of "dead" spots.

In any case, these pulping vats, kettles or cookers should discharge into an open trough or demountable pipe of corrosion-resistant metal that can be kept in a sanitary condition. All equipment must be so constructed that it can be easily and thoroughly cleaned. Use of heavy metals should be kept at a minimum; copper is preferable to brass and brass to iron.

Making Sulphur Solution

To produce the solution of sulphur dioxide used in preserving the fruit, the following method may be followed: Place on a scale a barrel containing 378 lb. of water. Run sulphur dioxide gas, which must be free from arsenic, into the water through a laboratory tube. This is continued until enough gas has been dissolved to bring the weight of the contents of the barrel to 400 lb. Specific gravity of the solution should be 1.025 or upwards. The water should be as cold as possible, and the gas must be fed in gradually. Six to 10 hours are usually required to obtain a solution of the required strength.

Making the Product

Generally speaking, the fruit is prepared for preservation by this process by the same methods as for canning or cold packing.

Weighed quantities of this prepared fruit are placed in the pulping tank. (If a jacketed kettle or cooker with closed coils is used, 15 percent of water based on the weight of the fruit should

(Turn to page 103)

Polyphase Freezing Process Developed; Low-Cost Unit Built

By LUIS H. BARTLETT

Mechanical Test Engineer, Bureau of Engineering Research, University of Texas, Austin, and

W. R. WOOLRICH

Dean of the College of Engineering, University of Texas

PART II—Here is the answer to the South's need for an efficient, inexpensive means of preserving its surplus food. The freezer is as new as the process it utilizes—polyphase quick freezing. Its advantages are many

THE mechanical elements of the University of Texas polyphase quick freezing system include a standard refrigerating unit and the machine which maintains the polyphase medium in operating condition, effects contact between it and the foodstuff, and separates the two after freezing is complete. One type of machine operates continuously and is best adapted to handle articles which weigh less than one-half pound each. It consists of a refrigerant-jacketed horizontal tube, partially filled with the polyphase medium, inside which a closely fitting helicoid conveyor operates. This tube terminates in feed and discharge compartments which are connected by a return conduit. The discharge compartment is equipped with a suitable grid which is periodically traversed by a raking device.

A circular oscillation is superimposed upon the normal rotation of the conveyor screw to provide the necessary agitation. This motion removes the fluid film and the freshly formed ice crystals from the refrigerated surfaces and thus materially increases heat transfer. A suitable mechanism regulates the rate of travel through the tube to allow complete freezing of various sized articles. The relation of these parts, with the exception of the driving gear and the drainer mechanism, is diagrammatically shown by Fig. 3.

Food which is to be frozen is dropped into the feed compartment and floated by the stream of medium into the spaces between the conveyor flighting. No rigid confinement occurs, and since the food floats, distortion or crushing is impossible. The slow oscillation of the helicoid gently moves the pieces about, both in relation to the fluid and to each other, while the rotational movement propels the entire mass through the tube to the discharge compartment. Here the medium flows through the grid and the return conduit to the feed compartment. The frozen product, which has acquired considerable mechanical strength, is retained by the grid and is then removed to the drainer. Small units employ a discharge compartment holding a considerable quantity of frozen product which, periodically, is manually raked to the screen-bottom drainer. Larger units embody an auxiliary helicoid conveyor, which propels the frozen product into and through a perforated, inclined drainer tube, where the excess medium is removed and returned to the freezer by gravity.

In developing these freezing units, several desirable characteristics have been attained, namely:

1. Simplicity: All parts except the driving gear are fabricated from standard pipe, welding fittings, helicoid conveyors, and structural shapes; small units have one moving part in contact with the heat transfer medium, while the largest ones have only four.

2. Minimum weight and dimensions: A unit having a freezing capacity of 50

Feeding Valencia orange segments into the receiving end of the University of Texas polyphase quick freezing unit.

to 100 lb. per hour requires a floor area of 8 by 1½ ft. and weighs 700 lb., while a 300- to 600-lb. capacity machine weighs 3,500 lb. and measures 12 by 5 ft. All vertical dimensions are less than 7 ft.

3. Ability to handle the most viscous heat transfer fluids: Media having viscosities as high as 10,000 centipoises at the operating temperature have been successfully employed.

4. High rate of heat transfer from the medium to the refrigerated surfaces: Coefficients up to 200 B.t.u. per hr. sq. ft. deg. F. may be secured in actual operation. Since evaporator temperatures are seldom lower than minus 20 deg. F., standard refrigerating machines and direct expansion can be employed.

5. Low power requirement: Excluding the power for refrigeration, the small unit is driven by ¼ hp. while the larger one requires ¾ hp.

6. Small charge of heat transfer medium: Only 100 gal. is required for the 300- to 600-lb. capacity unit. This permits rapid attainment of operating temperature after a prolonged shutdown period.

7. Small insulated area: The large unit has 70 sq. ft. of insulated area and may thus be operated in hot environments without appreciable heat leakage.

Application of Process

Any food which permits free drainage of adhering fluid may be advantageously frozen by the University of Texas polyphase quick freezing process. Articles of highly irregular shape, such as leaf vegetables, retain an undesirable quantity of the medium upon the surfaces. Normal gravity draining from smooth spherical surfaces leaves a film weighing 0.03 grams per square centimeter which is approximately 50 percent sugars. Thus the added sugar is approximately 6 percent of a product composed of ½-in. spheres and 3 percent for 1-in. spheres. If this small percentage of sugar should be objectionable, it may be almost completely removed by a brief cold-water rinse immediately before using. The loose pack allows the water to quickly contact each individual piece, and, thus, in addition to the washing action, very rapid defrosting is secured.

The process has been exhaustively tested upon both experimental and semi-commercial scales. About 6,000 lb. of a diversified assortment of foods has been frozen, many of these foods being listed in Table II. Some of these products have been in storage more than a year. Several types of packages, including metal cans, paraffined chipboard boxes with vaporproof cellulose film liners, and unlined cold-paraffined paper ice cream cartons, were used for storage containers. Metal cans and lined chipboard boxes have been entirely satisfactory. Some dehydration of products stored in the unlined ice cream cartons has occurred. There is a marked variation in the condition of individual packages of the same lot of frozen food.

TABLE II—Time Required by University of Texas Polyphase Quick Freezing System to Freeze Various Foods, Using Media at —2 deg. F.

FRUITS

Fruit	Variety	Size	Portions	Freezing time (in minutes)
Apple	Jonathan	2–2½ in.	eights (a)	5–7
Apple	King David	2½ in.	eights (a)	7–9
Apple	Stark	2½–3 in.	eights (a)	8–10
Banana	Unknown	1 in.	peeled whole	10–12
Blackberry	Haupt	⅝–¾ in.	whole	5–6
Cantaloupe	Heart of Gold	5 in.	sixteenths (b)	10–12
Dewberry	Unknown	¾–⅞ in.	whole	7–9
Fig	Celestial	1–1¼ in.	whole (c)	9–12
Fig	Magnolia	1¾–2¼ in.	whole (c)	15–20
Fig	Ramsey seedling	1¼–1¾ in.	whole (c)	13–17
Grapefruit	Marsh seedless pink	64 count	segments (d)	5–8
Grapefruit	Marsh seedless white	64 count	segments (d)	5–8
Jujube	Lang	1 in.	whole	6–8
Mango	Unknown	2½ in.	quarters	5–6
Orange	Valencia	128 count	segments (d)	5–7
Papaya	Unknown	3-lb. fruits	1½-in. cubes	13–15
Peach	Augbert	2 in.	eighths	5–17
Peach	Elberta	2½ in.	eighths	7–9
Peach	Leona	2½ in.	eighths	7–9
Peach	Montopolis	2 in.	eighths	5–7
Pear	Bartlett	110 size	quarters (a)	8–10
Pear	Kieffer	2½ in.	quarters (a)	7–9
Pear	Pineapple	2 in.	quarters (a)	5–7
Pineapple	Mexican		½-in. slices	4–5
Prune	Italian	1¼ in.	halves	4–5
Strawberry	Blakemore	¾–1 in.	whole	7–9
Youngberry		¾–1 in.	whole	6–8

VEGETABLES

Vegetable	Variety	Size	Portions (e)	Freezing time (in minutes)
Asparagus	Unknown	½–¾ in.	whole stalk	4–7
Bean, lima	Fordhook		shelled	90 sec.
Bean, snap	Kentucky Wonder		whole	4–5
Bean, snap	Black Valentine		whole	3–4
Broccoli	Unknown	¾–1 in.	whole	8–11
Carrot	Unknown		0.8 & 1 in. cubes	5–9
Okra	Unknown	½–¾ in.	whole	4–7
Pea, garden	Telephone	⅜ in.	shelled	2
Pea, black eyed		¼–⅜ in.	shelled	90 sec.

FLESH FOODS

Flesh Food	Cut and size	Freezing time (in minutes)
Beef	¾-in. steaks cut from Spencer roll	6–8
Beef	2-in. cubes cut from shoulder clod	15–18
Pork	½–¾ in. chops	4–8
Pork	3-in. sections of loin, weight ¾ to 1¼ lb.	18–24
Pork	Boston butt, weight 3.7 lb.	45
Veal	1-in. slices cut from shoulder clod	8–10
Chicken	1½-lb. fryer, disjointed	5–11
Shrimp tail	29 count	4–5

(a) These items were peeled and cored by machine.
(b) The melon was halved, seeds and peel removed, and each half cut into eight segments.
(c) These items were lye-peeled and the stems removed.
(d) Citrus fruits were steam-peeled, rag peel removed by lye, and segmented by hand.
(e) All vegetables were steam blanched and cooled by water spray.

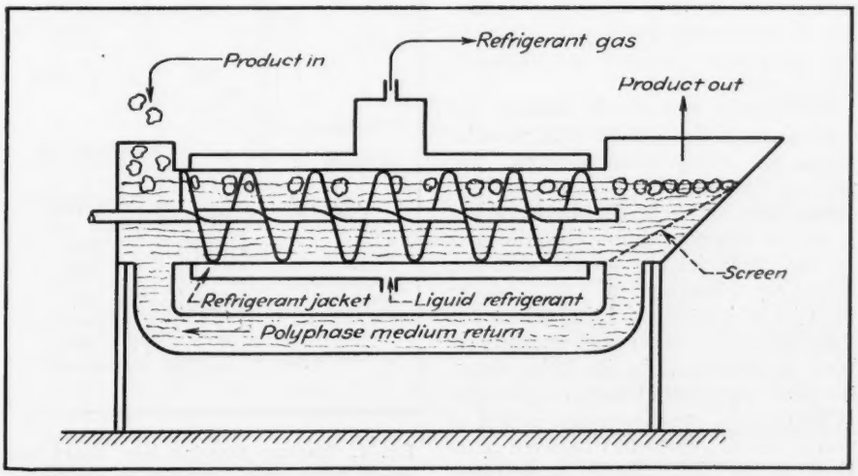


Fig. 3. Schematic diagram of University of Texas polyphase quick freezing machine.

This may be traced to differences in the thickness of the paraffin coating. The cartons which were heavily coated showed no dehydration of the contents while desiccation was noticeable in the lightly coated packages.

The freezing machines are well adapted to be transported and thus to follow the fruit and vegetable harvests. Their low weight and freedom from vibration obviate the need for special foundations. They are compact enough to be mounted in the cramped quarters available aboard a fishing boat or fleet tender and to operate upon the fishing grounds. Seafoods may be frozen literally "while they are still kicking," and the deterioration and loss caused by the practice of packing the catch in crushed ice may be avoided. Tressler states that fish packed in this manner are in prime condition for only a few hours and after one to three weeks are unfit for food.[6]

The process patents under application by the coinventors, Bartlett, Woolrich and Brown, will be assigned to the Texas Research Corp. A licensing system will make the process available for the preservation of high-grade foods.

References:

6. D. K. Tressler, "Marine Products of Commerce," 282, The Chemical Catalog Co., Inc., New York, 1923.
7. W. R. Woolrich, *Proceedings Louisiana Engineering Society* XXVI, 140, 1940.

Doubles Refrigerating Capacity by Draining Ammonia Lines

By E. G. APPLEGATE

Refrigeration Engineer, Glen Ellyn, Ill.

By applying the steam-trap principle to a refrigeration system, flooded condition of lines is corrected and compressors function as intended. Efficiency increased enough to handle much bigger load

HOW to meet the prospective demand for increased refrigeration was the problem faced by a meat packer in the Mid-West more than three years ago. An addition to the plant was a possibility to be faced. But a more immediate need was to step up the efficiency of the existing plant facilities and in that manner take care of the increased production until an addition to the plant became imperative.

The existing refrigeration services were supplied by one 18x22-in. Vilter cross-compound steam-driven machine rated at 125 tons capacity, one 18x26-in. Wolf-Linde single-stage steam-driven machine rated at 70 tons capacity, and one 9x9-in. Howe 3-cylinder electrically driven machine rated at 90 tons capacity. With its total rating of 285 tons of refrigeration, the system appeared to have no reserve capacity to handle the anticipated increased production load. To install an additional machine would have involved more than the mere expenditure of capital—finding the space in which to install the additional equipment would have been a problem.

Because of the complexity of the problem, a critical study was made of the existing refrigeration needs of the plant, the operating efficiency of the refrigeration system and the possibilities of revamping the system to meet the prospective demand for increased refrigeration.

The study was made during the greater part of the 1938 summer months when the refrigeration demand was greatest. To meet the demand all three compressors had to be kept in operation It was in this connection that the part of the study having to do with the operating efficiency of the system brought to light a condition which for some reason or other had consistently been overlooked. In its 1938 status, the plant represented several expansions in production capacity over a period of years. These expansions involved additions to the plant and, in some cases, increases in the number of coolers.

Causes of Inefficiency

Impairment of the efficiency of the refrigeration system began with the increases in cooler capacity, assuming that the plant had a balanced refrigeration system at the beginning, an assumption which has to be made with some doubt. Except for calculating the length of the cooling coils to be hung in the added cooler room and the corresponding quantity of refrigerant to be added to the system when the new coils were cut into the existing refrigeration lines, no study was made of the effect of the increase of cooler-room capacity upon the system as a whole. If additional compressor capacity was needed, it, too, was added with little or no more serious study than when additional cooling coils were added to the system.

As a result of this haphazard expansion of the refrigerating system to keep pace with the growth of the plant production capacity, some rooms were inadequately piped, the system was charged with an excess of refrigerant and at times, the entire system was under forced operation in an effort to get the desired temperature in the coolers.

At the time the 1938 study was made, the system was under a heavy operating load. The study revealed that the discharge lines on the compressors became heavily covered with frost during the peaks of heaviest operating demands. This frost clearly indicated that for

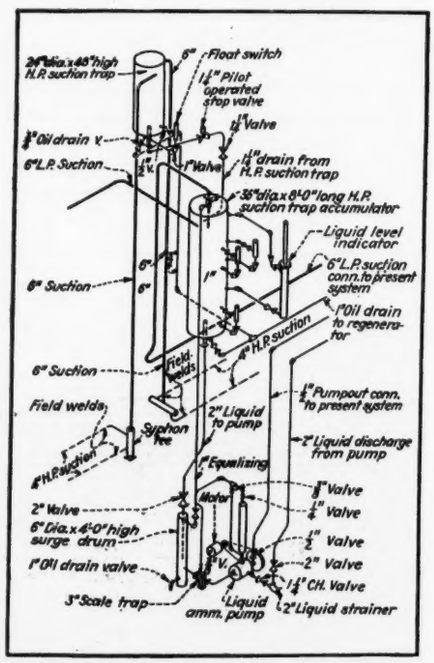


Fig. 1. Diagram showing how liquid ammonia traps were installed to double refrigeration capacity.

some reason abnormal cooling resulted at those places.

All the refrigerating equipment was of the direct-expansion ammonia type. Also, with the exception of one or two air-cooling units of the flooded type, all valves on the line were under manual control. Since many of the valves were old and not gas-tight, the amount of ammonia gas in the lines was not under positive control. Under these conditions, the explanation for the frosting of the compressor discharge lines was that, instead of working on gaseous ammonia, as they should have been, the compressors were functioning as pumps for "wet gas" (gas containing liquid ammonia) which flooded the system. This condition of operation did not permit complete compression of the gas. Consequently, unusual expansion took place in the discharge lines, with resulting formation of frost.

Condition Corrected

Taking the frost formation as an indication of marked inefficiency in the operation of the compressor, the deduction was made that the existing equipment could be made to handle the anticipated additional load by correcting its operating conditions. That assumption led to the installation of liquid-ammonia traps, on the high and low suction lines, connected with a liquid recirculating pump.

As shown in Fig. 1, a 3x8-ft. vertical tank was connected into the low-pressure suction line. This tank drained by gravity into a rotary liquid ammonia pump. Into the high-pressure suction line a 2x4-ft. vertical tank was connected with a drain outlet into the tank on the low-pressure suction line.

To keep the liquid level in the low-pressure tank under positive control, that tank was equipped with two float valves. The cycle of operation was such that when the liquid ammonia in the low-pressure tank reached a predetermined level, approximately two-thirds the height of the tank, the pump would be cut in through a relay switch. Then the contents of the tank would be pumped out to within about 1 ft. of the bottom of the tank. Leaving a leg of about 1 ft. of liquid in the tank was necessary to prevent vapor-locking of the pump.

Also, the valve in the high-pressure tank was set to control automatically the draining of that tank. When the liquid level rose to the 3-ft. depth in the tank, a magnetic valve in the line connecting the high-pressure tank with the low-pressure one opened. Since the pressure on the high line was 25 lb. per square inch and that on the low-pressure line was only 7½ lb. per square inch, the liquid ammonia drained into the low-pressure tank under a pressure differential of 16½ lb. per square inch.

Control Valve Necessary

After a trial operation, a control valve on the high-pressure tank was found necessary to prevent draining into the low-pressure tank before that tank was empty. Otherwise, the liquid level in the low-pressure tank rose so high that liquid ammonia slugged over into the line leading to the compressors. This automatic control was obtained by means of electrical interlocks. These prevented the valve on the high-pressure tank from opening when the liquid level was above the 6-ft. line (two-thirds of its height) on the low-pressure tank, the level at which the pump on the low-pressure tank automatically starts if the float valves work properly. When these electrical interlocks come into operation, the valve on the high-pressure tank does not release until the low-pressure tank is emptied down to the 1-ft. level.

The tanks were also equipped with sight-gage floats and over-level alarms which set off a siren in case the pump failed to start. That warning was to avoid the overfilling of the high-pressure tank with a backing up into the high-pressure suction line. These warning and interlocking devices were found necessary because the original float valve froze up. Later, the original valves were replaced by floats of different design. However, the interlocking and warning devices were retained for safety.

Originally, the pump emptying the low-pressure tank discharged directly into a receiver tank. But trouble arose because of excessive vaporizing of the ammonia in the receiver. The difficulty was overcome by connecting the pump discharge line into the header on the ammonia condenser with a baffle in the header between the cut-in for the compressor discharge line and that for the pump discharge line.

Following these changes all of the refrigerating equipment, particularly the pump discharge line to the condenser, was fully and carefully insulated with a 6-in. cork covering, commercially known as "brine cork covering." That precaution prevented useless wastage of refrigerating capacity. In fact, the new set-up will not work unless that discharge line is insulated.

Load Increased

Encouraged by the improved functioning of the existing refrigerating equipment and the ease with which it handled the preliminary load increase, decision was made to build an additional freezer and throw that load increase upon the refrigerating machines.

The new freezer called for 19,000 linear feet of 2-in. direct-expansion pipe in eight banks; four banks were two pipes high and four banks were four pipes high.

All changes were completed so that the system could be put into operation in January during a low-demand period. By so doing, an opportunity was had

(Turn to page 85)

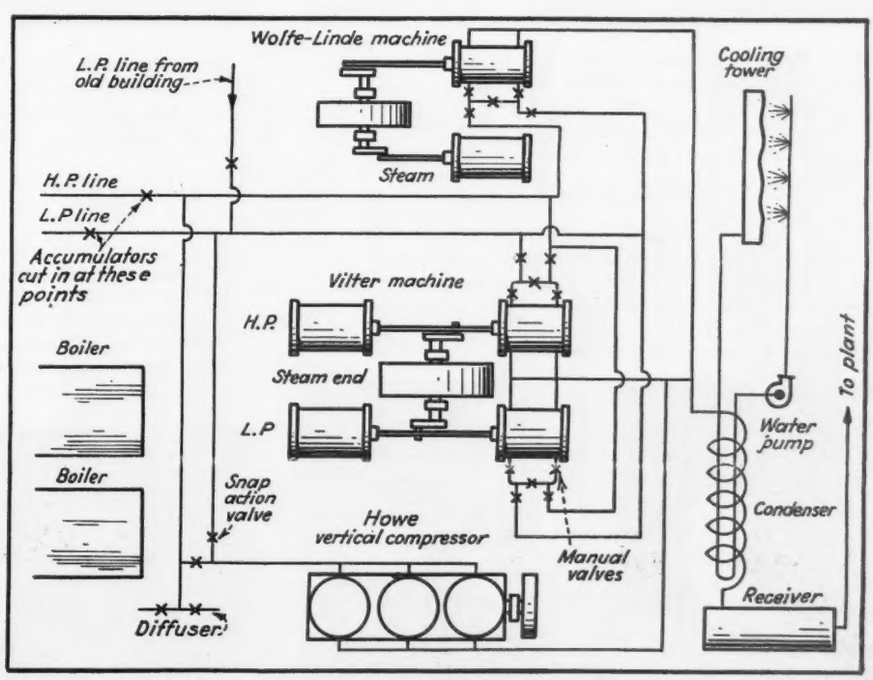
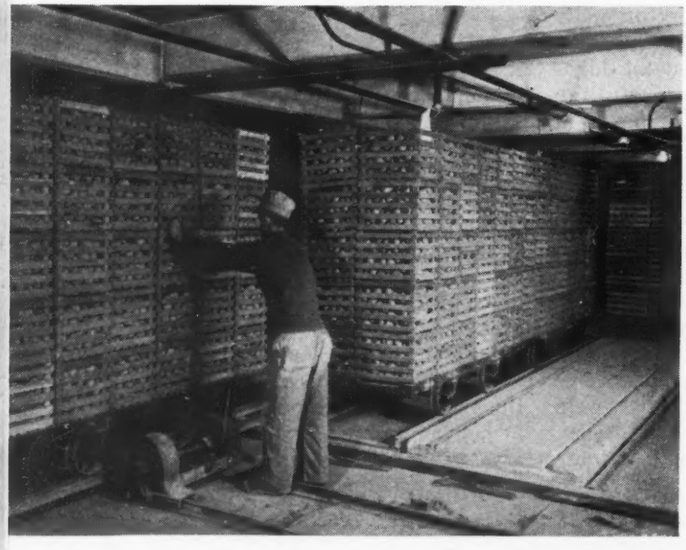


Fig. 2. Sketch showing arrangement of refrigerating machinery, with points of cut-in for ammonia trap lines indicated on the high- and low-pressure lines.

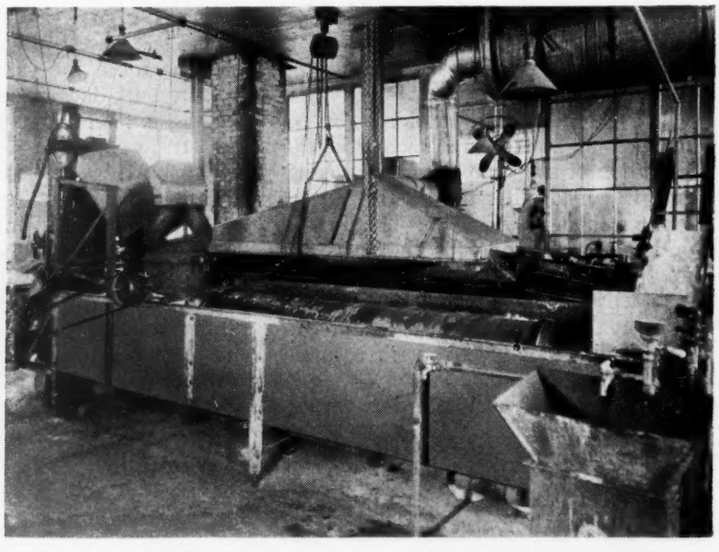
PICTURES OF

Potato chip manufacture has pro-
kettle operation to a carefully con-
ing many unit operations. Other food
the pictures on these pages showing
Ross Potato Chip Co., Richland, Pa.,

1 Potatoes from a nearby farm being unloaded at the Ross plant. The potatoes are emptied into crates on a truck which moves by rail into the storage room.



2 Sixty crates of potatoes on truck are moved by one man to position inside storage room. A "transfer unit" operating on rails permits load to be placed easily onto any one of several parallel tracks in the room. Potatoes are conditioned for frying by storage for 30 days.



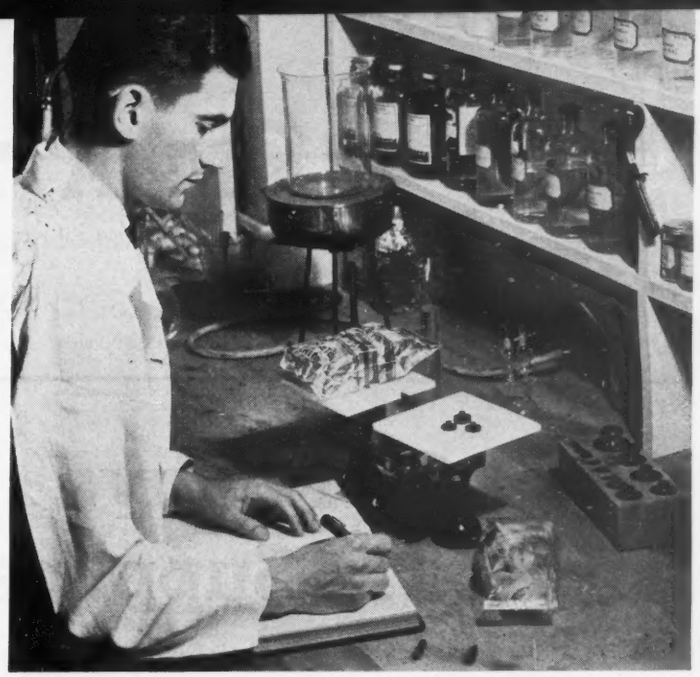
4 Potatoes brought up from peeler by elevating conveyor at extreme left empty into a rotary slicer and the uniformly thin slices pass into a rotary drum washer inside the long tank. Conveyor at right takes washed slices to continuous fryer in background.

3 Potatoes are peeled by abrasion at rate of a bushel a minute in machine at right, being simultaneously washed by stream of water. Then they empty into bin for inspection and are picked up by elevating conveyor at left which takes them to slicer on floor above.

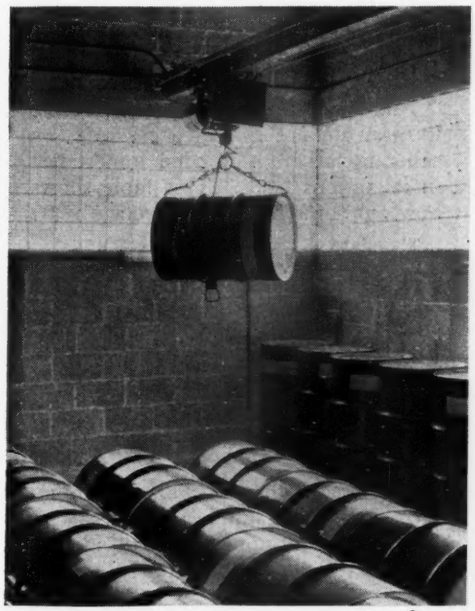
5 Having passed through a vat of hot cooking oil on a conveyor, the deep-fried crispy potato chips discharge from the fryer and are carried under a continuous salter and onto an open-mesh conveyor that takes them to the packaging department. Two recorders chart the temperatures at the receiving and discharge ends of the fryer and permit regulation of the rate of feed. Capacity of fryer is 300 bu. of potatoes a day.

PROCESSES

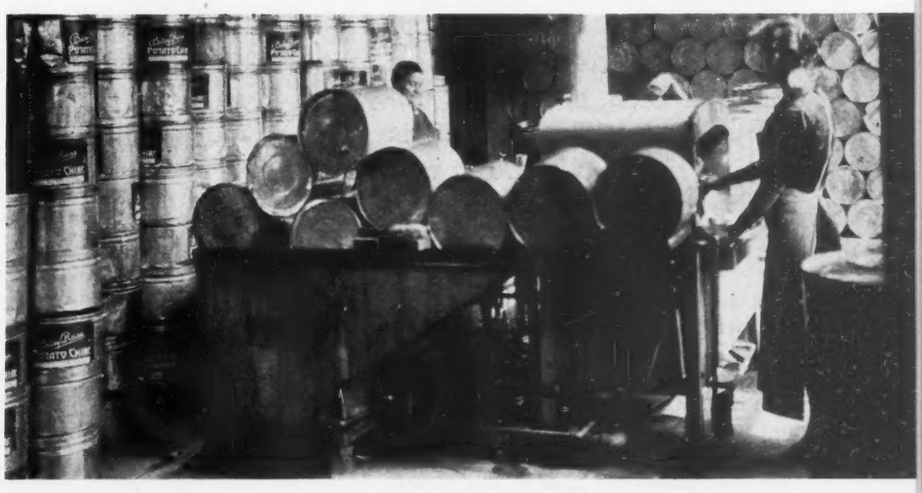
gressed in recent years from a batch-
trolled and efficient process involv-
industries may get some ideas from
how things are done in the plant of
where "Betsy Ross" chips are made



10 Like other quality-controlled food processes, the manufacture of potato chips is guided by a technologist and a laboratory.

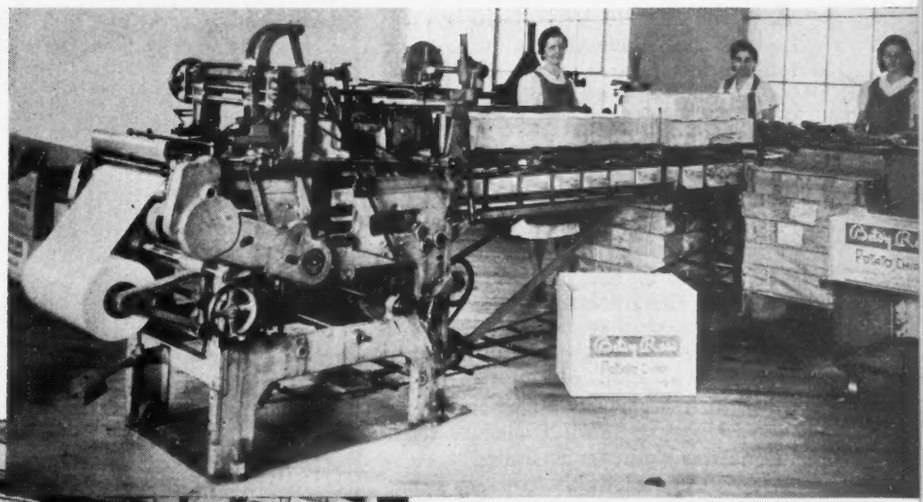


8 Salad oil for frying the potato chips is bought in large drums which are moved into and out of storage with an electric hoist that can be pulled along an overhead rail.



9 Washing the large cans in which potato chips are packaged in bulk.

6 The open-mesh conveyor discharges the potato chips onto a stainless-steel belt conveyor in the packaging room. The chips travel the length of this conveyor then drop to the bottom side to be carried back until "plowed" off into one of the bins where girls put them into sacks. The long conveyor travel permits the chips to cool to packaging temperature.



7 The sacks are carried by belt conveyor to girls who put them into cartons which are wrapped and sealed in waxed paper by machine at left. Scale in background is for check-weighing. Cartons are put into cardboard boxes which are sealed with gummed paper and moved by roller conveyor to the shipping floor. Then they are loaded onto trucks for distribution.

MATERIALS

Official Facts About the Supplies of Tin • Directory of Whole-Egg Driers

What OEM Says About Tin Supplies

Here's an official* quick picture of the tin situation. There's a year's supply on hand, a U. S. smelter is under construction and ore is coming from Bolivia. But war in the Pacific can spoil the picture

It is an old story that "the best laid schemes o' mice and men gang aft a-gley." OEM's ideas and plans can be knocked into a cocked hat by the Japanese if they capture and occupy Borneo and Malaya. This statement about tin was prepared considerably before the events of December 7, 1941, and should be interpreted in that light.—EDITORS.

THE United States consumes more than 100,000 tons of tin a year. Last year we produced domestically 44 tons, mostly from Alaska. That leaves 99,966 tons we must import and that's the reason the hearts of American tin men skip a beat every time war clouds loom up in the Pacific. For trouble in the Pacific, at Singapore or in the Netherlands Indies, might mean drastic curtailment of our tin supply.

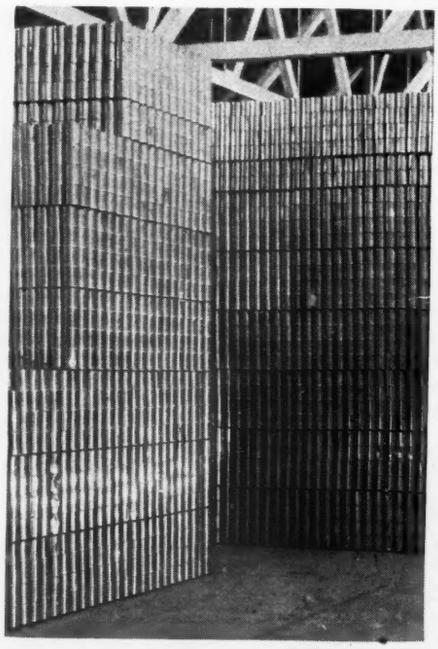
Singapore is the heart of the tin world, or the tin heart of the world, whichever you prefer. Of the 124,810 long tons of tin imported into the United States in 1940, 96,454 came from the British Malay States, where Singapore is located, and 12,101 tons from the nearby Netherlands Indies.

It's a sad fact, but a true one, that the United States just does not and cannot produce any substantial quantities of tin domestically, although this country is the world's largest consumer.

While small amounts of tin are used industrially in the manufacture of bronze and other alloys, and for solder, type metal, and foil, more than half the total annual consumption goes into that standby of American life, the tin can.

Of course, the tin can isn't all tin; it is a thin sheet of steel with an even thinner coating of tin, but so important is the "tin" can to our way of living that we regularly use more than half the world's production. The United States produced more than 17 billion tin-coated cans in 1940.

If shipping is interrupted for any reason, that flow of tin will cease. Ancient armies, who drove their food supply with them on the hoof, would not have thought that any cause for alarm, but the modern soldier on the battlefield lives on canned foods. Civilians do too, as a matter of fact, and a curtailment of our tin supply would mean a serious disruption of American life.



The United States produced more than 17 billion tin-coated cans in 1940. A large proportion of these was for the food industries, but tin is used for other things than cans in the food field.

The trouble is not that tin is a neglected metal in the United States. We just do not have any ore. A thorough investigation by the United States Bureau of Mines resulted in this report, issued in March, 1941:

"These early results tend to strengthen the conviction that no appreciable part of the tin required by American industry can be supplied from known domestic sources, regardless of how great the stringency or how high the price."

And we just must have tin. While its uses are not as varied as are some other metals, it is of vital importance in its various fields. This table shows how our tin is used in an average year:

Tin plate	40.4%
Solder	21.8%
Babbitt metal	7.2%
Bronze	6.8%
Collapsible tubes	5.9%
Tinning	3.1%
Type metal	1.9%
All other uses	12.9%

The manufacture of tin cans consumes 90 percent of the tin plate and a large percentage of the solder made with tin.

Faced with the possibility of an interruption of tin supplies from overseas, the government not long ago decided to do something about it—and did.

The Government Acts

The first step was to begin piling up a reserve stock in this country. At the beginning of 1940, the Procurement Division of the Treasury Department started to acquire a stockpile of tin. So did the Navy. The result is that these and other governmental agencies and private purchasers now have more than a year's supply of tin on hand in the United States. Of the total, the government now holds 21,419 long tons of tin in storage, which will be held for at least three years after January 1, 1941, as a permanent "crisis" supply.

A year's supply of tin in storage is a comfortable feeling—but not comfortable enough. It was felt that a surer, safer, steadier source of continuing supply was necessary. The result of that feeling is the new American smelter now under construction at Texas City, Tex., owned by a subsidiary of the Reconstruction Finance Corp. and managed by Dutch East Indies interests. It will have an estimated capacity of 18,000

* This information is from the Office for Emergency Management, Washington, D. C.

DIRECTORY OF WHOLE-EGG DRIERS

Plants in operation and contracted to be built, as of December 15, 1941.

NAME	LOCATION	SYSTEM
Armour & Co.	Dennison, Iowa	Spray (C. E. Rogers Co.)
	Sedalia, Mo.	Spray (C. E. Rogers Co.)
	Springfield, Mo	Spray (2) (Douthitt Corp.) (Armour & Co.)
Bowman Dairy Co.	Harvard, Ill.	Spray (C. E. Rogers Co.)
	Brooklyn, Wis.	Spray (C. E. Rogers Co.)
Center Milk Products Co.	Trenton, Mo.	Spray (Douthitt Corp.)
Colfax Co-op. Creamery	Colfax, Wis.	Spray (Douthitt Corp.)
Commercial Creamery	Spokane, Wash.	Spray (Own Unit)
Conestoga Cream & Cheese Co.	Lima, Ohio	Spray (Douthitt Corp.)
Cudahy Packing Co.	Cuero, Tex.	Spray (Cudahy)
Denison Poultry & Egg Co. (Kraft Cheese Co.)	Denison, Tex.	Spray (Kraft)
De Soto Creamery	Minneapolis, Minn.	Spray (Douthitt Corp.)
Domestic Egg Products Co. (Doughnut Machinery Co. subsidiary)	McKenzie, Tenn.	Spray (Douthitt Corp.)
	Chickasha, Okla.	.....
	Enid, Okla.	.....
	Shawnee, Okla.	.....
	Wichita Falls, Tex.	.....
Doughnut Machinery Corp.	New Berlin, N. Y.	Spray (Douthitt Corp.)
	Frankfort, N. Y.	.....
	Ogdensburg, N. Y.	.....
Dunkel, Samuel	New York, N. Y.	Spray (Own unit)
Emulsol Corp., The	Chicago, Ill.	Pan (Emulsol)
Fletcher-Eichman & Co.	Sheboygan, Wis.	Spray (Clark-Fenlon)
Fort Worth Poultry & Egg Co. (Armour subsidiary)	Ft. Worth, Tex. (2 plants)	Spray (3) (Douthitt Corp.) (C. E. Rogers Co.) (Armour & Co.)
Fort Worth Poultry & Egg Co.	Lampasas, Tex.	Spray (C. E. Rogers)
Harp, O. G., Poultry & Egg Co.	Shawnee, Okla.	Spray (2) (C. E. Barnhill)
Hazelwood, Inc.	Portland, Ore.	Spray (C. E. Barnhill)
Henderson Produce Co.	Monroe City, Mo.	Spray (Douthitt Corp.)
Henningson Bros., Inc.	Denison, Tex.	Spray (Kraft)
	Fort Worth, Tex.	Spray (Douthitt Corp.)
	Lamesa, Tex.	Spray (Douthitt Corp.)
		Pan (Own unit)
Hiawatha Dairy Co.	Hiawatha, Kan.	Spray (Douthitt Corp.)
Hood, C. H., & Co.	St. Albans, Vt.	.....
Jerpe Commission Co.	Omaha, Neb.	Spray (Cardwell-Westinghouse Co.)
I and O'Lakes Creamery Co.	Ripon, Wis.	Spray (Douthitt Corp.)
Lowe, Joe, Corp.	San Antonio, Tex.	Spray (Joe Lowe Corp.)
	Winnipeg, Man.	Spray (Joe Lowe Corp.)
Maple Island Dairy Co.	Stillwater, Minn.	Spray (2) (C. E. Rogers Co.)
Marshall Produce Co.	Marshall, Minn.	Spray (Douthitt Corp.)
Marshall Kirby & Co.	Jersey City, N. J.	Spray (Own unit)
	Terre Haute, Ind.	Spray (Own unit)
Marshfield Dairy Products Co.	Marshfield, Wis.	Spray (Douthitt Corp.)
Mid-States Frozen Egg Co.	Indianapolis, Ind.	Spray (Mojonnier Bros., Inc.)
Milk Products, Inc.	Eau Claire, Wis.	Spray (Douthitt Corp.)
Moss, David L. & Co., Inc.	Chicago, Ill.	Spray (David L. Moss & Co., Inc.)
Omaha Cold Storage Co.	Omaha, Neb.	Spray (Omaha Cold Storage Co.)
Pietrus & Sons, A. J.	Sleepy Eye, Minn.	Spray (Douthitt Corp.)
Priebe & Sons, Inc.	Manning, Iowa	Spray (Douthitt Corp.)
Red 73 Creamery Co.	Union City, Ind.	Spray (C. E. Rogers Co.)
Saline Co. Milk Producers' Assn.	Marshall, Mo.	Spray (Douthitt Corp.)
Stamper, F. M., Co.	Moberly, Mo.	Spray (Douthitt Corp.)
Swift & Co.	Des Moines, Iowa	Spray (Douthitt Corp.)
	Sedalia, Mo.	Spray (Douthitt Corp.)
	Muskogee, Okla.	Spray (Douthitt Corp.)
Tranin Egg Products Co.	Kansas City, Mo.	Spray (Tranin)
	Chicago, Ill.	Spray (Tranin)
Twin Ports Co-op. Assn.	Superior, Wis.	Spray (Douthitt Corp.)
Waconia Co-op. Dairy Co.	Waconia, Minn.	Spray (Douthitt Corp.)
Washington Co. of Poultry & Egg Co.	Lyndon, Wash.	Spray (Douthitt Corp.)
Wilder, T. E., & Associates	Platteville, Wis.	Spray (Douthitt Corp.)
Wilson & Co.	Atchison, Kan.	Spray (Cardwell-Westinghouse Co.)
	Abilene, Tex.	Spray (C. E. Barnhill)
Wisconsin Egg Products Co.	Ocona, Wis.	Spray (C. E. Rogers Co.)

tons, about 15 percent of the annual national consumption, when it is completed early in 1942.

A second reason, and one of equal importance for the erection of the Texas City smelter, is to provide a market for South American ores, chiefly from Bolivia. With its European markets cut off because of the war, Bolivia faced a domestic crisis until the United States stepped in and contracted for the bulk of its ores. It was practical "good neighborliness," for the United States insured a part of its own needs at the same time. The United States has contracted to purchase sufficient ore to provide 18,000 long tons of smelted tin a year from Bolivian producers.

These steps have eased the tin situation in this country to a certain extent, but the men charged with keeping the United States, its soldiers and its sailors supplied with this vital material still were, and are, looking for corners to cut and new methods of conservation.

The method being used at present amounts to a virtual corner on the world's tin supply. Before the outbreak of the war, European smelters refined the bulk of South American tin. With these closed down, imports into the United States have mounted steadily. This is how the figures on imports appear:

1939	70,104 tons
1940	124,810 tons
1941 (est.)	150,000 tons
1942 (est.)	165,000 tons

If the 1941 estimated importation holds true throughout the year, the United States may easily absorb two-thirds of the total world production, estimated at 230,000 tons.

All very well, say the tin men, provided nothing interferes. Of course, Great Britain must have guns, they say, and planes and tanks and weapons of all kinds. So must Russia. So must China. But they also must have food, lots of it, particularly England, which grows only a small part of the food needed to feed the teeming population of the island.

Food Without Tin Cans?

How would we send food to England without tin cans? How would our ships at sea, so vital to world communications, keep going without canned food.

Faced with these questions, the Conservation Unit of the Office of Production Management moved, in April, 1941, to make a further saving in the use of tin. Can-making companies were consulted and an agreement promptly was reached reducing by 10 percent the amount of tin in a can. This can be done in 95 percent of the cans in use without danger of contamination. The amount of tin was not reduced in cans holding certain types of foods. In addition, makers of collapsible tubes were asked to substitute tin-lined tubes for ones of pure tin for shaving soaps and the like.

Further economies in the use of tin are being studied. Electro-plated tin plate is a good example, and now is being used quite extensively.

That, in a general sense, is the present story of tin, one of this nation's most vital metals. There is nothing wrong with the picture, tin men say, provided:

1. The Pacific "lifeline" is kept open for a free flow of tin imports.
2. War does not interfere with the production and smelting of tin in Malaya and the Netherlands Indies.

Glass Shortage Seen as Possibility

SHORTAGE of glass-making materials is feared. The government is, therefore, urging members of the Glass Container Association to do everything possible to make their consumption of glass less next year. This is bad news for food packagers who have thought that they could always shift from tin to glass if tin shortages became serious.

It is expected that a very substantial increase in glass containers may be required in 1942. General increase in business activity, substitution of glass containers and a number of other factors would normally trend in this direction. Unless the average weight of bottles is made less, this may mean difficulty in getting the glass itself.

Mechanical System Proves Efficient for Refrigerating Trucks

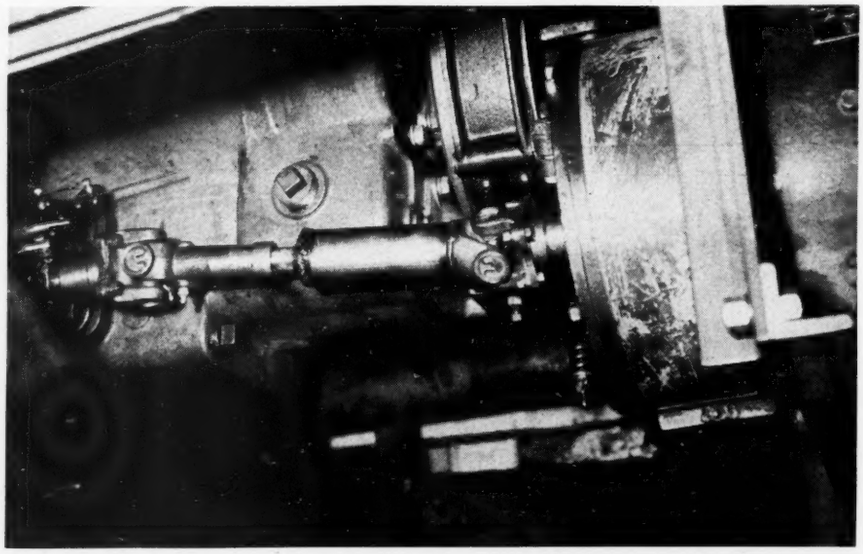
More uniform temperature and saving in expense obtained by equipping low-temperature frozen food trucks with finned coils and compressor units. Dry ice was formerly used

IT is essential that frozen foods distributed by motorized equipment from Seabrook Farms, the great growing, canning and quick-freezing enterprise developed by Charles F. Seabrook at Bridgeton, N. J., reach their destination, at no matter what distance from Bridgeton, at the same temperature as when loaded—and be maintained at that temperature en route. This maintenance of a nonfluctuating temperature eliminates losses due to shrinkage, change in grade or deterioration of product.

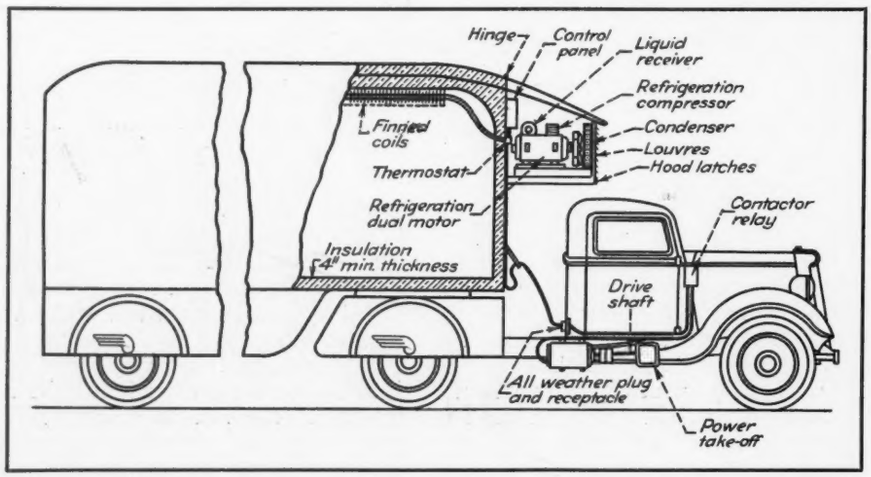
If these loads of frozen foods were all delivered to nearby distribution points, the problem of temperature maintenance might not be so important. But when loads are delivered to New York City, approximately 10 hours distant by road, and to so much more remote points as Boston, Chicago, Pittsburgh and even Florida and Canada, the need for an adequate and dependable automotive refrigerating system at once becomes apparent.

Such a system ties in with the modern methods employed at Seabrook Farms itself, a very large organization owning several thousand acres of farming land in South Jersey and also contracting for other farmers' crops. Besides the raising of vegetables, such as lima beans, peas, string beans, corn, broccoli, the organization does canning and quick freezing.

Much of the acreage is supplied with overhead irrigation, and this setup is said to be the largest of its kind in the country. The water-pumping system for this irrigation has a total daily capacity of over 12,000,000 gal.



Underneath view of the Century direct-current, constant-voltage generator driven off the tractor gear-set through Timkin special roller-bearing-equipped Spicer double universal joints and splined shaft. This generator supplies the current to run the Frick refrigerating system shown at the bottom of this and the opposite page.



Diagrammatic cross section showing the Frick Freon-12 refrigerating coils in the roof of the trailer; the Century dual a.c.-d.c. motor, compressor, condenser, control panel and thermostatic control valve, all mounted in a housing on the nose of the semi-trailer, and the power take-off and constant-voltage generator on the tractor.

Aside from the most modern food packing facilities, such, for example, as the packing of a ton of shelled peas every four minutes, and the use of the latest quick freezing machines, the organization has immense cold-storage facilities. These include over 300,000 cu. ft. of zero storage space and a special storage building in which 21,000,000 lb. of food can be stored at minus 5 deg. F.

The Seabrook Farms and the Deerfield Packing Corp. are said to be the world's largest motorized truck farm, with a fleet of 237 motorized units.

One of the Cumberland tractor-trailer units being loaded with Birds Eye frosted foods at the 21,000,000-lb. frozen food storage warehouse at Seabrook Farms in Bridgeton, N. J. The Frick refrigerating system on the trailer maintains an interior temperature of 0 deg. F. Various kinds of fruits and vegetables are hauled, green peas having perhaps the largest volume. Loads are distributed to New York City, Boston, Pittsburgh, Chicago and even to Florida and Canada.

These include farm tractors of all sizes, giant vining machines and eight diesel tractor-trailer units with refrigerated bodies.

These latter units are owned by the Cumberland Automobile & Truck Co., which distributes the frozen food products for the Deerfield Packing Corp. from the Seabrook Farms. The Cumberland company is a common motor carrier functioning under ICC regulation. Its trucks are refrigerated units in which the interior body temperature is maintained constant, no matter what the length of haul or how many times the doors are opened en route.

The vehicles consist of diesel tractors and semi-trailers with bodies 7 ft. 2 in. in height, 7 ft. 1 in. in width and varying from 16 to 24 ft. in length. Each body is insulated all around with 4 in. of fiber glass.

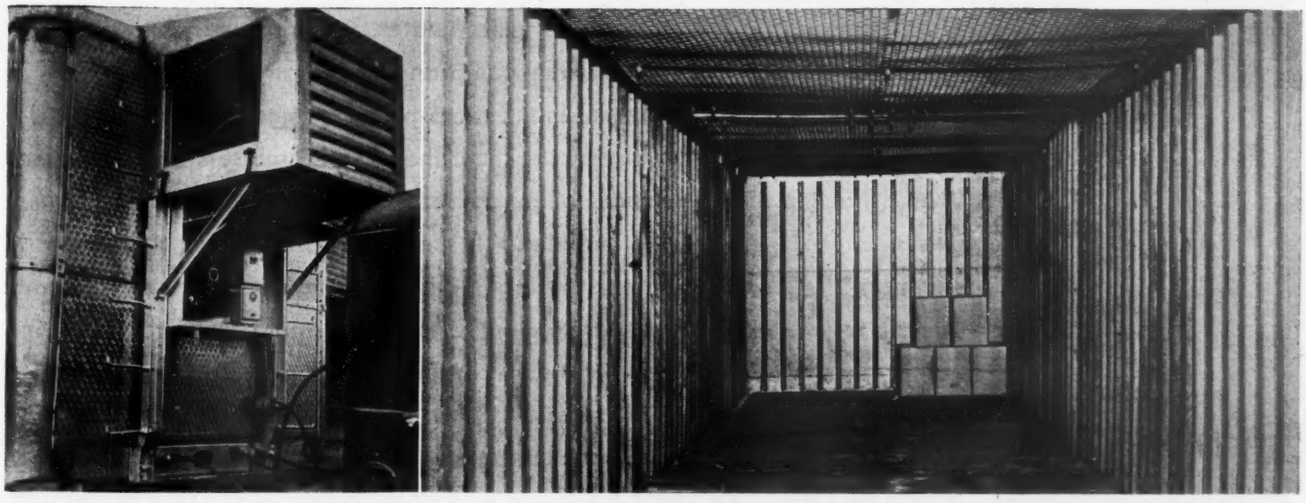
At first the trailer bodies were refrigerated by means of dry ice. If the bodies were cold and started out fully iced, they made the run to New York City and return to Bridgeton in some 20 hours and used about 500 lb. of dry ice.

The vehicles also ran to Boston, Pittsburgh or Chicago on a consumption of 900 lb. of dry ice, providing the trailer doors were not opened. But even one stop and door opening to deliver a portion of the cargo used a considerable amount of dry ice before the body and contents were brought back to the desired 0 deg. F. temperature.

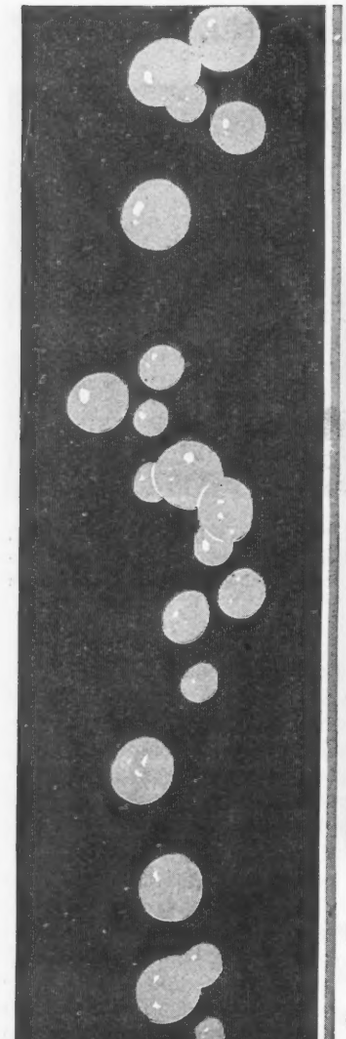
In the search by the Cumberland company for a more positive control of temperature maintenance, one of the units was equipped with mechanical refrigeration and tested for six months. The maintenance of temperature was so satisfactory and the savings in refrigeration cost were so marked that all seven of the other trailers were similarly equipped in one lot.

The equipment used consisted of a Freon-12 refrigerating system made by the Frick Co., Waynesboro, Pa., and operated electrically by a power take-off from the tractor engine through the Whitaker-Upp electric power system manufactured by the Century Electric Co., St. Louis Mo., with the entire installation made by the Frick company.

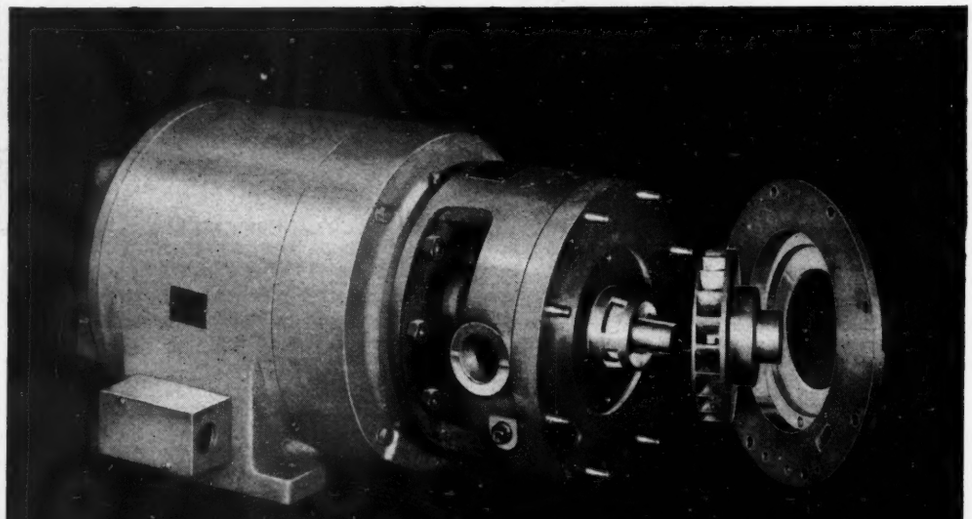
The details of the entire system are shown in the accompanying illustrations.



Left, the Frick refrigerating equipment mounted on the nose of one of the Cumberland trailers operated from Seabrook Farms. The upper housing contains the dual a.c.-d.c. motor; the refrigerating compressor, condenser and thermostatic control valve. In the separate metal box below are the control switches and the plug-in socket for a.c. current from a lighting circuit where the tractor-trailer is held non-operative at a terminal or elsewhere. Right, looking toward the front of the semi-trailer body and showing the roof finned refrigerating coils protected from damage by wire mesh. The wood slats on the trailer side walls and front end assure an adequate circulation of the cooling air. With frozen foods, the maintained body temperature is 0 deg. F.



ONLY CLEAN AIR CAN REACH YOUR PRODUCT FROM A NASH COMPRESSOR



Here is a compressor designed perfectly to meet the needs of the Food Plants. It is simple, for it has only one moving part, a rotor cast in one piece and rotating in the casing without metallic contact. This means trouble-free operation over long periods. It is compact and requires little valuable floor space. Its oversize ball bearings seldom require attention or lubrication. No lubrication is required in the interior, so that the air is kept clean from the time it enters the pump. • But this is not all. The compressing medium in the Nash Pump is a rotating column of clean water. The air is in intimate contact with this water in passing thru the pump and is actually scrubbed while it is being compressed. Dust present in the atmosphere is removed, and the air delivered free from dirt, oil, or heat, without the use of scrubbers or air washers. Think what this means in terms of purchase cost and floor space occupied by complicated air washing apparatus. • These pumps are proving their worth in the most trying service. They are ideal for transferring beer or wort from tank to tank by air pressure, for maintaining pressure on aging tanks, for supplying compressed air to bottling machines in racking, etc. • Available in any capacity, these pumps deliver pressures up to 40 lbs. absolutely uniform without storage tanks. • You want the most reliable pumping equipment in your plant, so by all means find out more about the Hytor. Our catalog No. 217 is free on request.

THE NASH ENGINEERING COMPANY

243 WILSON ROAD • SOUTH NORWALK, CONNECTICUT

FOOD INDUSTRY NEWS

GENERAL NEWS • TRENDS • MEN • JOBS • COMPANIES • JANUARY, 1942

War Brings New Problems To Food Manufacturers

Intensification of the industry's effort will be required. Many new troubles certain to come

EVERY division of food manufacture will be affected by war declaration. Mainly, there is intensification of effort. It is difficult at the outset to identify what some of the other more important changes may be, but certainly engineers and executives of our industries will have to note the following influences and prospective official actions:

1. More men will be taken for the Army. Those who have already been taken will stay for the duration. Greater use of women will be encouraged.

2. More food will be required in a processed form, particularly for Lease-Lend. Surplus will be stock-piled if ships do not permit movement to our allies.

3. Rapid shifts in containers will be required, especially economy on tin. Simplification and economy in wrapping will be forced.

4. Frequent and sudden suspension of material supplies must be expected. Note the stoppage of sale of automobile tires for a short time during the first week of the war.

5. Agriculture will be pushed for greater production; and the use of domestic materials will be made compulsory to lessen ship requirements.

6. The shifts from priorities to allocations will occur very fast. All very scarce materials will soon be allocated.

7. Price rises will be policed diligently. Washington is not going to tolerate profiteering. Some justification for any significant price rises will be expected.

8. Most food plants will be required to make blackout preparations, even in areas where bombing is a remote possibility.

9. Many very severe new taxes will be imposed soon.

10. Emphasis will be given to expansion of activity at plants which convert perishable to staple nonperishable food, but expansion of output will be forced by more shifts per week and more employees per shift rather than by plant expansion, wherever this is possible.

Forcasting on these subjects is difficult, may be deceptive. But there is no doubt about the seriousness of the study required on every one of these and many other features of food production by every management.

SMA Asks Industry To Make Citrus Pulp

UPON RECOMMENDATION of SMA, the Department of Agriculture has formally asked for offers from processing firms to manufacture grapefruit and orange pulp under specifications based upon British needs. SMA plans to purchase the fresh fruit and turn it over to plants whose processing offers are accepted.

SMA declined to announce the projected volume of pulp production sought for Britain, but it is understood to be considerable. This operation is in addition to SMA's plans for purchasing around four million boxes of citrus fruit during the winter season, largely in the form of canned grapefruit, grapefruit juice and concentrated orange juice.

Third Meeting of IFT To Be in Minneapolis

ANNOUNCEMENT has been made that the third annual meeting of the Institute of Food Technologists is to be held in Minneapolis, Minn., June 15-17.

Dr. C. H. Bailey, acting dean and director, Department of Agriculture, University Farms, St. Paul, is chairman of the local arrangements committee. M. E. Parker, production manager, Beatrice Creamery Co., Chicago, is chairman of the program committee. E. S. Stateler, associate editor, FOOD INDUSTRIES, Chicago, is chairman of the publicity committee.

Wide World

TESTING JAPANESE-GROWN VEGETABLES

Just to be on the safe side, more than 2,000 samples of Japanese-grown produce, taken from wholesale markets in Los Angeles, were analyzed by the state department of agriculture after the outbreak of war. Nothing was found wrong and rumors of possible sabotage of California vegetables through poisoning were declared "simply malicious and unfounded." Alien Japanese vegetable produce houses have been closed and it is said that all alien Japanese truck gardens will be taken over.

SMA Steps Up Production Of Processed Foods

Takes lead in planning the expansions in plant capacity necessary to supply food for Allies

SURPLUS MARKETING ADMINISTRATION by virtue of its position as the nation's biggest food buyer, particularly for Lease-Lend shipment, is taking the leadership in Washington on matters pertaining to programming necessary expansion in food processing. Already, SMA has acted in four processing fields to translate the Department of Agriculture's farm production goals into finished, packaged food products in required quantities. The agency's program for expansion of the nation's egg-drying facilities has been recorded.

Within the last month, SMA has initiated other expansion programs for dairy products (dried and evaporated milk, and cheese) for the four major canned vegetables and for concentrated orange juice. It also is sponsoring what amounts almost to development of a new industry, large-scale production of citrus fruit pulp as a base for marmalade, a staple in the British diet.

Processed dairy product goals were expected to be announced by SMA. Its goals for canned vegetables are discussed in another article in this news section, as is the program for developing the citrus pulp production.

SMA Helping on Priorities

SMA is carrying the ball not only in setting production goals for many of the processed foods which it needs in huge quantities, but its officials also help work out priority programs with OPM officials for speeding necessary expansion by processors. This was true in the egg-drying program, and it is being followed in the others.

Financial Aid Given

Even financing assistance is being offered, both to cooperatives and to privately owned processing concerns. Three North Central Dairy states cooperatives have arranged for Lease-Lend money from SMA to pay off Farm Credit bank loans for expanding their facilities. In mid-December SMA was also negotiating to provide Lease-Lend funds for a cooperative and a private concern in Florida for increasing orange juice production.

SMA officials justify their precipitate entrance into programming plant expansion of those foods needed in greater quantities with a simple explanation:

"Somebody has to step in and get adequate programs worked out far enough in advance to insure that we will get the products we need. We can't risk a repetition of last spring's canned tomato situation. All we are trying to do is translate the Department's farm production goals into processed foods and to make sure that there will be enough to supply the domestic market, the military and our own requirements."

Will Support Prices

This important shift in emphasis in the food field also carries over into the price situation. SMA intends to support the market up to the production quotas it decides upon for processed foods. Conversely, the agency, in at least one precedent-setting action, has acted to check rising prices. SMA rejected all bids on an offer for a huge quantity of raisins on the ground that the spread between farm price and the bids was excessive. A second invitation brought lower bids, generally.

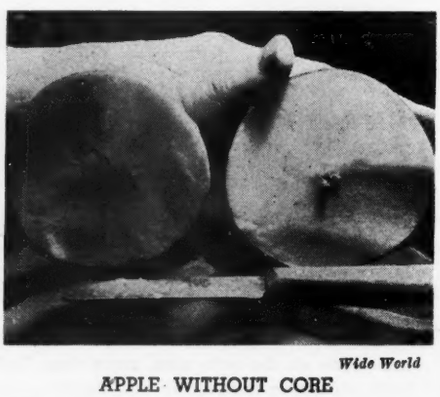
OPM Asks Bakers To Reduce Costs

Baking industry begins program to conserve packing materials and cut expenses for defense

A NATION-WIDE PROGRAM to reduce distribution and packaging costs of bakery products, both to keep retail prices stabilized and to conserve use of materials, was initiated in mid-December by OPM, OPA and the Bakery Industry Advisory Committee.

Quality of products was not involved, but preliminary discussions found general agreement on these steps: Greater economy in use of packaging and wrapping materials—greater re-use of and wider use of substitutes for corrugated and fiber containers for shipping; curtailment of unnecessary sales and distribution expenses, such as discontinuing premiums, combination offers, free goods, prizes and furnishing of display racks and other facilities in stores; better control of stale returns to reduce the quantity.

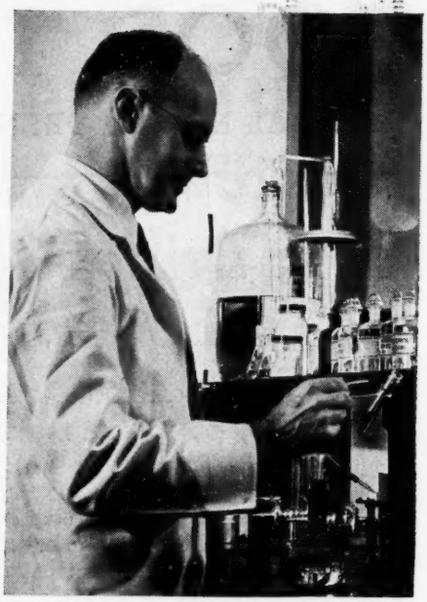
Government officials warned the industry against stocking up on materials in anticipation of price increase or supply limitations. J. T. McCarthy, OPM Food Branch bakery specialist, pointed out that government regulations which would likely accompany any shortage conditions might render useless large stocks on hand.



Wide World

APPLE WITHOUT CORE

Wormseye view of the inside of the coreless apple grown by Mrs. Libbie Wilcox, Huntington Park, Calif., housewife when she "monkeyed" wi.h the tree at her home.



HEADS DEVELOPMENT LAB.

Dr. F. L. Seymour-Jones is director of Borden Co.'s new laboratory for research in the development of new foods, located in New York. Dr. Seymour-Jones obtained a degree in applied chemistry from the University of Leeds, England, and he took post-graduate work at Columbia University. His 18 years with Borden have been devoted to research and development, sanitation and quality control, production and cost estimates on a wide variety of manufactured products of dairy and other origin. (See page 50 for article on new laboratory.)

6 Citrus Plants Use AMS

WITH six canning plants approved for continuous inspection, Florida packers may process over 6 million cases of Federally inspected citrus products in 1942, the U. S. Department of Agriculture Marketing Service announced last month.

Price Ceilings Put on Foods

Green coffee, pepper, cocoa beans, cocoa butter, all fats and oils except butter affected

OUTBREAK of war in the Pacific brought from Leon Henderson, price administrator, prompt action to prevent runaway prices in certain basic imported foodstuffs. On December 11 OPA issued temporary price ceilings for green coffee, pepper and cocoa beans and cocoa butter. The ceilings for the prices of these commodities were placed at the level of the prices prevailing on December 8.

On December 13 a further ruling established a ceiling price for all fats and oils except butter, the ceiling being the price prevailing on November 26.

CHICAGO DTS PRESIDENT

D. M. Hemb, of Elgin Milk Products Co., has been elected president of the Chicago Dairy Technology Society.

Sees Farm Labor Shortage

STATING that assuring an adequate supply of workers for America's farms is a big task ahead, Federal Security Administrator Paul V. McNutt on December 15 announced the expansion of the farm-placement machinery of the Social Security Board's U. S. Employment Service.

Priority for Insecticides

MANUFACTURERS of insecticides, germicides and fungicides can obtain an A-10 priority for purchasing three-month supplies of scarce materials under Priority Order P-87, issued by OPM on December 13. Application is made on form PD-82. Products produced with the rating may be used only by the food industries.

TODAY you must have FLEXIBILITY and ADAPTABILITY in Packaging Machinery

The ability to adapt your business to changing conditions is of extreme importance today. This fact should be borne in mind when considering packaging machinery.

Here's a wrapping machine that gives you the broadest leeway in meeting new conditions . . . Designed for extreme versatility, it permits the wrapping of a wide range of sizes. You can change your package size at will, or add new sizes to the line. Widest choice in the selection of wrapping material is possible because the FA can be adapted to glassine, transparent cellulose, waxed paper, foil, printed paper, etc. And it uses these materials in economical roll form . . . Should you ever wish to use a different type of wrapping material in the future, the change can be easily accomplished with the FA.

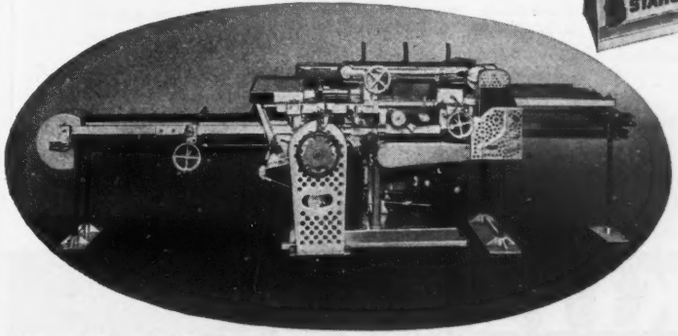
The FA is now the most widely used wrapping machine in the field—proof that it has what it takes to meet today's conditions.

Write for our new FA booklet

PACKAGE MACHINERY COMPANY
Springfield, Massachusetts

NEW YORK CHICAGO CLEVELAND
LOS ANGELES TORONTO

Mexico, D. F.: Agencia Comercial Anahuac, Apartado 2303
Buenos Aires, Argentina: David H. Orton, Maipu 231
Peterborough, England: Baker Perkins, Ltd.
Melbourne, Australia: Baker Perkins, Pty., Ltd.



PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

Why more food plants are changing over to Oakite Cleaning

NEW YORK CANNER CLEANS KETTLES LOW-COST WAY!

Here is a short story about a New York canning plant that found a successful way to keep sanitation costs low by getting MORE and BETTER cleaning for their money!

Previously, in this plant, cleaning cooking kettles took a lot of tedious, time-consuming scrubbing and scouring. It's different now! Equipment is first brushed with solution of recommended Oakite cleaning material, then pressure-rinsed. Due to its vigorous yet safe detergent action, this Oakite material completely removes deposits FASTER, leaving surfaces in sanitary, film-free condition. Since time is saved and only small amount of material is required, costs are lower than before.

Investigate These Advantages NOW!

If your plant is operating on an accelerated production schedule to help meet Army, Navy, export and civilian food requirements, it will also pay you to investigate the many ways tested Oakite cleaning materials and methods can HELP YOU maintain required quality standards more easily, step-up sanitation efficiency, save money in cleaning. Write today . . . no obligation.

OAKITE PRODUCTS, INC.
26G THAMES ST., NEW YORK
Representatives in All Principal Cities of the United States and Canada

Nation-Wide Service In These Industries

CANNING
DAIRY PRODUCTS
SEA FOOD
COLD STORAGE
BAKING
CONFECTIONERY
GRAIN PRODUCTS
MEAT PACKING
FLAVORING EXTRACTS
SAUCES & SOUPS

OAKITE TESTED CLEANING
MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

Will Set Quotas For Processing

SMA expected to announce goals for 1942 production of the four major canned vegetables

OFFICIAL DEPARTMENT OF AGRICULTURE goals for four major canned vegetable packs in the 1942 season were expected in mid-December to be announced in the near future. For two of these products, canned tomatoes and peas, the goals were expected to be accompanied by formal price minimums for finished products at which Surplus Marketing Administration, buying chiefly for Lease-Lend shipment or food stockpiles, will support the market.

The official goals for finished food products marks another step in SMA's program of converting the Department of Agriculture's farm production goals into food goals at the table level.

Decision on the goals for canned tomatoes, peas, snap beans and corn were prepared under SMA guidance after meetings with representative canners in Washington during December. For these meetings, SMA prepared tentative goals, based upon estimated domestic needs, including military and school lunch uses, as well as Lease-Lend and stockpile requirements. Final official goals were expected to be slightly lower than these original tentative estimates:

Tomatoes — domestic 35,000,000 cases; Lease-Lend, 8,000,000 cases; needed to restore carryover to normal, 1,000,000 cases. Total 44,000,000 cases.

Peas—domestic, 32,000,000 cases; Lease-Lend, 8,000,000 cases; needed to bring carryover to normal, 2,000,000 cases. Total 42,000,000 cases.

Snap beans—domestic, 12,000,000 cases; Lease-Lend, 1,500,000 cases; needed to bring carryover to normal, 500,000 cases. Total 14,000,000 cases.

Corn—domestic, 24,000,000 cases; Lease-Lend, 2,500,000 cases; needed to bring carryover to normal, 1,500,000 cases. Total 25,000,000 cases.

New York State Adopts New Meat Regulations

NEW REGULATIONS governing the sale of meat and meat products in New York State have been released by the State Department of Agriculture and Markets "to give greater protection to the consuming public." Defining the specific character of meats and meat products, the State demands that ham shall be ham, that chili con carne contain not less than 40 percent meat,

corn beef hash contain not less than 35 percent corned beef, and that chicken loaf shall contain a certain amount of that product.

The regulations include labeling requirements which must be strictly observed by manufacturers and packers.

Ships Use Lard As 'Refrigerant'

Lard replaces refrigerant when used as insulator for perishable foods on shipments to Britain

AN ENCOURAGING DEVELOPMENT in the shipping of Lease-Lend foods came with the discovery that lard can be used as an insulator for perishable foods en route to Britain. U. S. refrigeration experts, faced with a shortage of refrigerated space in ships, suggested dry ice for frozen foods. But it remained for Chicago packers and the American Meat Institute to develop the use of lard—an excellent thermal insulator, as well as a staple much in demand in Britain.

In a chamber specially constructed to simulate ship-hold conditions, Chicago technicians covered floor and walls with 56-lb. boxes of frozen lard, layers of paper, and close-packed boxes of meat, previously frozen to below-zero temperature. After three weeks trial, the meat was unpacked and found to be frozen solid, with the lard also in good shape. A subsequent shipment to Britain, consisting of mild-cured ham and pork, insulated by frozen lard, arrived in port in perfect condition.

Government Acts To Save Tin Through Allocations

Supplies put under Federal control. Food industries affected. Brewers may have to use bottles

TIN SUPPLIES in the country, en route to the U. S., and all future imports were brought under complete government control by action of OPM on December 17. Future imports and shipments afloat as of the date of the order may be purchased only by the Metals Reserve Co. of the Reconstruction Finance Corp.

The step was preliminary to an all-out allocation program in which uses of tin supplies will be drastically curtailed to conserve stocks which now must come through the war-infested Pacific route. The allocation regulations were being prepared following the December 17 conference. It can be stated that the initial restrictions will not ban the use of tin for foods requiring vacuum packing for their preservation—fruits, vegetables, and so forth. It appeared likely also that no ban would be issued, at least at this time, on the use of tin for many food staples now packaged in tin containers, such as coffee and baking powder.

It was almost certain that the impending allocation order would, however, provide for a steadily decreasing use of tin for beer cans and for complete prohibition of this type of container as rapidly as brewers can convert plants to bottling. And the order was being drafted to ban the use of tinned containers for most nonfood commodities.

Can manufacturers met with OPM just prior to issuance of the order freezing stocks. Industry spokesmen at that session asked for allocation of 4,000 tons of tin monthly for plating steel for food containers. It was expected that the allocations order, however, in addition to specifying the monthly allotment, would dictate the proportion to be used for various types of products—so much for canned meats, canned fruits and vegetables, and so forth.

SMA To Finance Plant Expansion

Lease-Lend funds to be advanced to dairy cooperatives as well as to orange juice processors

TO OBTAIN rapid expansion in production facilities for two vitally-needed Lease-Lend foods, Surplus Marketing Administration in December made available government funds to finance processing facilities.

Three dairy cooperatives, two in Minnesota and one in Wisconsin, will get lend-lease money from SMA to pay off Farm Credit bank loans made for expanding their facilities for making evaporated milk and cheese. Details as to amount of money and expansion involved were not disclosed. The cooperatives are the Juneau Dairy Cooperative Creamery, Juneau, Wis.; Itasca County Cooperative Creamery, Bovey, Minn., and Land O' Lakes dairy cooperative at Faribault, Minn.

At the time these contracts were announced, SMA was negotiating similar deals with a private company and a cooperative in Florida for expanding facilities for producing concentrated orange juice. The process concentrates the juice to one-tenth natural volume for shipment to Britain where water is reintroduced. Pectin from the orange seeds will be a byproduct operation also for Lease-Lend purchase.

When SMA reimburses the concerns to permit repayment of their bank loans, title to the facilities will pass to the government, with the cooperatives and the private company operating the plants on a rental basis with option to buy them after the war.

INTRODUCING OUR NEW ASSISTANT EDITORS

The names of Robert W. Dispennett and Elizabeth B. Shaw go onto the masthead of "Food Industries" as Assistant Editors with this issue. Mr. Dispennett is a graduate of Rose Polytechnic Institute with a B.S. degree in chemical engineering, and he is a member of American Chemical Society. Before coming with "Food Industries" six months ago he was inspector, control chemist and assistant production manager with Quaker Maid Co., Inc., Terre Haute, Ind., manufacturers of "Ann Page" foods for A & P. Miss Shaw is a graduate of Wheaton College and she took graduate work at Columbia University. She came with "Food Industries" as editorial assistant a year ago.

Butter Makers Discuss Problems

Effects of Lease-Lend program and facts about cream quality are high points at meeting

WITH the highest registration in its history, American Butter Institute held its 33rd annual meeting in Chicago on December 2 and 3. Total attendance at meetings exceeded the registration of 452 by more than 10 percent.

Sessions which drew the heaviest attendance were those given over to Lease-Lend and cream quality control subjects. Dr. E. W. Gaumnitz, of the Surplus Marketing Administration, in reviewing the Lease-Lend program of procurement in relation to butter, estimated that diversion of liquid whole milk to the production of cheese and evaporated milk is up about one-third over the normal and that skim milk production is about normal on a percentage basis. Piling up of an excess of butter which is not being absorbed by the Lease-Lend buying is the brake on dried skim milk production. Present outlook is that the milk production will be ample to meet domestic and export demands. The U. S. Department of Agriculture is promoting an increase in the production of milk on the basis that more dairy products ought to be consumed domestically to obtain a higher level of national health, to meet demands of the Lease-Lend program of 250,000,000 lb. of cheese, 20,000,000 cases of evaporated milk and 200,000,000 lb. of dry skim milk annually for the British, and to supply other European and Asiatic needs. These demands are likely to continue for five or more years after the war.

To a large extent processing facilities are ample to handle the milk supply in most dairy areas, and no government support will be given to the increasing of processing facilities in those areas. In other areas where a milk supply of desired quality is plentiful but processing facilities inadequate or lacking, government financing support will be given if private and local financing can not be had.

Forming of farmer cooperatives is looked upon with favor by the Agricultural Department.

Cream Quality Discussed

In giving their report on cream quality the Research Committee members staged a panel discussion dealing with production problems and with field work observations and experience on the care and handling of cream from cow to churn.

Education of cream producing farmers on the economics of keeping cream cool, keeping milking and separating equipment clean and in good repair, and making frequent deliveries to the creamery was agreed to be the best way of getting cream of low mold content. Four-day old cream was cited as of border-line quality.

In summing up the result of laboratory studies sponsored by the Research Committee, Dr. B. W. Hammer, Dairy Bacteriologist, Iowa State College, reviewed the effects of various factors on the growth of molds in cream.

Factors Affecting Mold

Tests showed that: (1) Mold growths develop faster at 70 to 85 deg. F. than at 60 or 98 deg. F., (2) growths occur primarily in the top ½-in. layer of cream in a container where air is plentiful, (3) new cream poured in on top of older cream without stirring retards mold growth because of cutting down time of surface exposure to air, (4) frequent stirring of cream in a container also retards mold growth, and (5) mold growth is inhibited by use of table salt and other salts such as calcium propionate.

Shape of container was reported to be of major importance in cutting down mold growths. Containers with a top diameter smaller than the bottom diameter give best results.

BEER MERRY-GO-ROUND

Here's a beer distributor's practical solution to the problem of finding the right beer at the right time to please a customer. Four turntables were installed in a walk-in cooler by Kramer Party Supply Dayton, Ohio. Each has five shelves of 4-ft. diameter, holding 1,320 bottles of beer. Carrier Corp. helped develop the device.

Controversy on Ice Cream Seen

Differences probably will be argued at standards hearing to be held on January 6

THERE are no Federal "advisory" standards for ice cream and frozen desserts at present. Therefore the Food and Drug Administration's proposed standards for ice cream and related products start from scratch. The subject was considered at informal meetings of the Food Standards Committee in November, 1939 and February, 1941, and a number of industry proposals were made at those times. Reference to those proposals discloses a few points which differ from the F&DA proposed standards as published in the *Federal Register* on November 1. Because of these differences, controversy may well arise at the formal hearing which begins on January 5.

Riboflavin Enrichment Of Flours Postponed

THE EFFECTIVE date of riboflavin enrichment of enriched flour, enriched bromated flour, enriched self-rising flour, and enriched farina was postponed to July 1 by an order in the *Federal Register* of December 3. Insufficient manufacturing capacity before that mid-1942 date was given as the reason for delay in requirement of this particular ingredient. All other requirements of the standards of identity for all flours were unchanged, with effective date January 1, as originally announced.

Grapefruit Juice Standards

A DRAFT of U. S. standards for grades of canned grapefruit juice has been developed by the AMS and has been submitted to the industry for its consideration. The standards became effective December 15.

Genealogy

In order to make it a matter of annual record, this statement is published every January:

FOOD INDUSTRIES was founded in 1928 by McGraw-Hill Publishing Co. Dr. H. C. Parmelee was its first editor. Dr. L. V. Burton succeeded him and is its present editor. Associated with him are: E. S. Stateler, associate editor (now located in the Chicago office); G. L. Montgomery, associate editor; F. K. Lawler, managing editor; R. W. Dispennett, assistant editor; Elizabeth B. Shaw, assistant editor; R. S. McBride, editorial representative in Washington; and Earle Mauldin, editorial representative in Atlanta, Ga.

Sugar Buying Restricted

OPM ISSUED an order on December 14 designed to prevent excessive or abnormal inventories of direct consumption (refined) sugar by wholesalers, jobbers and industrial users and assure normal supplies of sugar for home consumption and industrial use. The order provides that no "receiver" shall accept delivery from an importer or refiner of more sugar during any one month that he received during the corresponding month of 1940, and at the same time the order freezes any stocks in the hands of receivers in excess of 60 days' supply.

To Study Frozen Foods

CHIEF SPEAKER of the University of Tennessee's freezer-locker short course (January 12–16, at Knoxville) will be H. C. Diehl, Western Regional Research Laboratory, who will discuss the processing and freezing of fruits and vegetables. The short course will cover the basic principles of frozen food processing and storage.

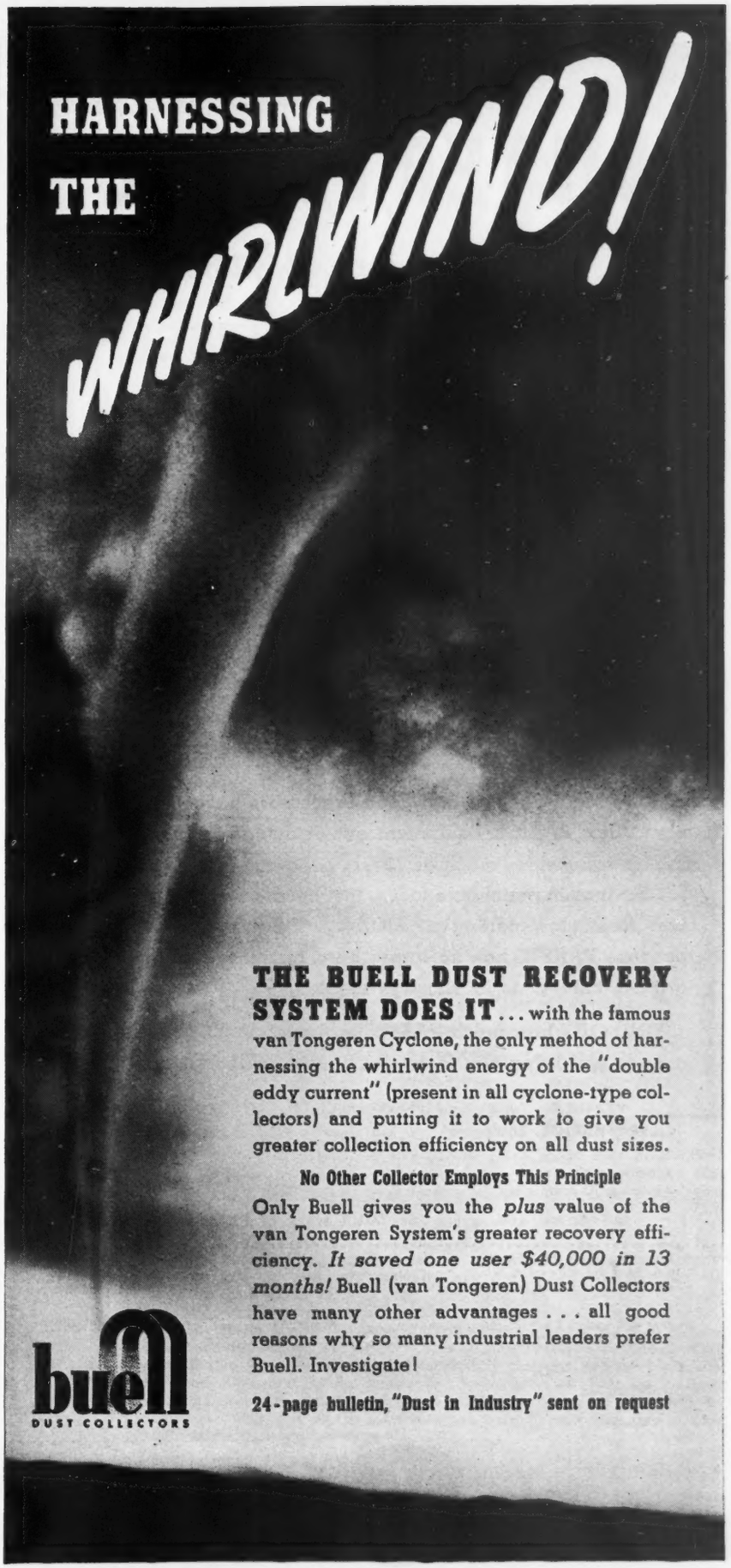
SCHEDULE OF EVENTS

JANUARY

4–17—American Institute of Baking, 4th annual Cake Course, Chicago.
7– 9—Northwest Canners Association, annual convention, Seattle, Washington.
12—United Brewers Industrial Foundation, 5th annual convention, Miami Biltmore Hotel, Coral Gables, Fla.
12–16—Freezer-Locker Short Course, College of Agriculture, University of Tennessee, Knoxville, Tenn.
13—Dairy Industries Supply Association, 23rd annual convention, Hotel Biltmore, New York.
13—Southeastern Millers Association, Brown Hotel, Louisville, Ky.
17–24—United Fresh Fruit and Vegetable Association, annual convention, Belleview Biltmore Hotel, Belleair, Fla.
19—Cooperative Food Distributors of America, Sherman Hotel, Chicago.
19–20—American Bakers Association, Wholesale Cake Branch, Hotel Sherman, Chicago.
22—National Peanut Week.
25–27—National Food Brokers Association, Palmer House and Morrison Hotel, Chicago.
25–27—National Sugar Brokers Association, Chicago.
25–27—Potomac States Bakers Association, Lord Baltimore Hotel, Baltimore, Md.
26–28—National American Wholesale Grocers Association, Chicago.
26–30—Canning Machinery and Supply Association, Stevens Hotel, Chicago.
26–30—National Canners Association, annual convention, Stevens Hotel, Chicago.
26—National Macaroni Manufacturers Association, Morrison Hotel, Chicago.
26–27—National Preservers Association, Morrison Hotel, Chicago.
26–29—National Quick Frozen Foods Exposition, La Salle Hotel, Chicago.
28—National Pickle Packers Association, Palmer House, Chicago.

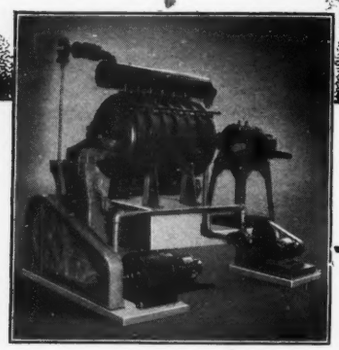
FEBRUARY

12–13—Ozark Canners Association, annual convention, Colonial Hotel, Springfield, Mo.
15–22—National Cherry Week.
17–19—Technical School for Pickle and Kraut Packers, Michigan State College, East Lansing, Mich.
25—Wine Institute, Palace Hotel, San Francisco, Calif.


HARNESSING
THE
WHIRLWIND!
THE BUELL DUST RECOVERY SYSTEM DOES IT... with the famous van Tongeren Cyclone, the only method of harnessing the whirlwind energy of the "double eddy current" (present in all cyclone-type collectors) and putting it to work to give you greater collection efficiency on all dust sizes.
No Other Collector Employs This Principle
Only Buell gives you the plus value of the van Tongeren System's greater recovery efficiency. It saved one user $40,000 in 13 months! Buell (van Tongeren) Dust Collectors have many other advantages . . . all good reasons why so many industrial leaders prefer Buell. Investigate!
24-page bulletin, "Dust in Industry" sent on request
buell
DUST COLLECTORS
BUELL ENGINEERING COMPANY, Inc. Suite 5000, 8 Cedar Street, New York
NATION-WIDE SERVICE THROUGH OFFICES OF EITHER BUELL ENGINEERING CO. OR B. F. STURTEVANT CO.

VILTER PAKICE Equipment

Will PAY FOR ITSELF in YOUR Plant, too!



Many Meat Packers and Food Processors have paid for their new Vilter PAKICE Equipment out of actual savings . . . Savings in ice cost (as much as 70%) . . . Savings in time and labor . . . Savings in perishable foods, too, because of better refrigeration from slow-melting PAKICE . . . Savings in equipment, because PAKICE has no large, hard lumps to damage or dull grinder knives, as in sausage making.

FIND OUT how much PAKICE will save in YOUR Plant. The coupon will bring you facts and figures. Check it TODAY!

VERTICAL Type VILTER PAKICE Equipment

Available in units of ½, 1, 2½, and 5 tons daily capacity, with storage bin. Illustration above—½ ton unit, completely self-contained.

HORIZONTAL Type VILTER PAKICE Equipment

Available in units from 15 to 30 tons daily capacity in 5-ton increments. Illustration above—30-ton unit with Briquette-making attachment. Floor space—less than 9 x 12.

● *Tear off and return for* **YOUR** *story of* **PAKICE** *Savings* ●

THE VILTER MFG. CO.
2115 S. First St., Milwaukee, Wis.
Please send us more details on SAVINGS with VILTER PAKICERS to fit the following conditions:

Amount of Ice used: Daily ..... Annually ..... Water: Temperature .....

Cost ..... Power: Volts ..... Ph. ..... Cycle .....

Cost per K. W. H. ..... Present cost of Ice per ton.....

Name ....

Address ....

City..... State.....

Since 1867 VILTER Refrigeration... Air Conditioning

★ THE VILTER MFG. CO. ★

2115 South First Street — Milwaukee, Wisconsin

Offices in Principal Cities

"Undaunted by apparently insurmountable difficulties, Chemist Dorp bravely tackled the freezing problem . . . Say, what the hell kind of technological report is this, Dorp?"

Latin America to Get Tin Plate from U. S.

AT THE request of the Economic Defense Board, the Supply Priorities and Allocations Board, top defense agency, voted in pre-war December to make available for export to Latin American nations 218,600 metric tons of tin plate for food containers. The allocation is to cover a year's shipments, but 35 percent of the amount will be rushed within the next three months to nations south of the border now in the midst of their canning pack.

The U. S. supply is designed to replace tin plate which Latin American countries normally obtain from Germany and England.

The allocation marks the first specific step in the U. S. policy of aiding Latin American nations to obtain essential commodities to meet their import needs.

Tariff May be Cut On Fish from Iceland

NEGOTIATION of a trade agreement with Iceland will probably continue despite entry of the United States into the war. The State Department has announced a list of products on which the United States will consider the granting of tariff concessions to Iceland. Some reductions in tariff may be made on: Dried and unsalted fish; prepared and preserved fish; pickled or salted fish; smoked or kippered fish; caviar and other fish roe; fish scrap and fish meal; cod and cod liver oil; herring oil; and certain other fishery products.

CAPITAL VIEWS

PLENTY OF FOOD—Stampedes of buying cleared dealers' shelves of many specialties during the first week of the war. For example, flashlights and flashlight batteries became almost wholly unavailable in many areas where blackouts threatened. It was this situation which caused the President to emphasize so strongly in his first fireside chat that there was plenty of food in the United States. Generally speaking, this is true. But the food industries well know that certain specific shortages are bound to be felt and some changes in diet habit are going to be necessary by Spring at the latest. The job of the food executive and engineer is to cushion these shifts by offering an effective dietetic substitute as promptly as possible.

REPLACE TIN—Substitution of other sorts of packaging machinery to save tin containers is now a reality. The Pacific war is going to speed up tremendously this important packaging readjusmtent.

RAW MATERIAL CUTS—Even on trade routes maintained open regularly there will now be a greater shortage of ships than ever before. This means that before many months, stocks of imported raw materials will begin to be unavailable. Food plant executives who have perfected plans for change in formulas, based on domestic rather than imported raw material, will have the jump on others when the pinch really comes. Initially, the shortage will be in specialties, like some spices. Later there will be a pinch on sweeteners and perhaps certain types of food fats. America may have an abundance of protein materials, but Lend-Lease will take so much of this abundance that the public may feel a scarcity in that field also.

BY FOOD OR DRUG?—Much free advice is being given by Washington regarding improvement of health through better diet. Some fanatical recommendations still escape official vigilance. The public is therefore being encouraged to do much in the way of eating vitaminized, iodized and other fortified foods. It is encouraging to the food manufacturers, therefore, to find that several important influences are being brought to bear in official circles to secure better health conditions by proper eating, and by properly balanced diet, instead of by taking pills for supposed deficiencies. One important precaution governs food company planning for such foods. It is very important that special foods containing more than normal of some important dietetic ingredient be so presented to the public that they will carefully show their relation to natural values. If they are put in the class of "dietetic food" by excessive claims there are important label and distribution restrictions which may do more harm than good to a merchandising program.

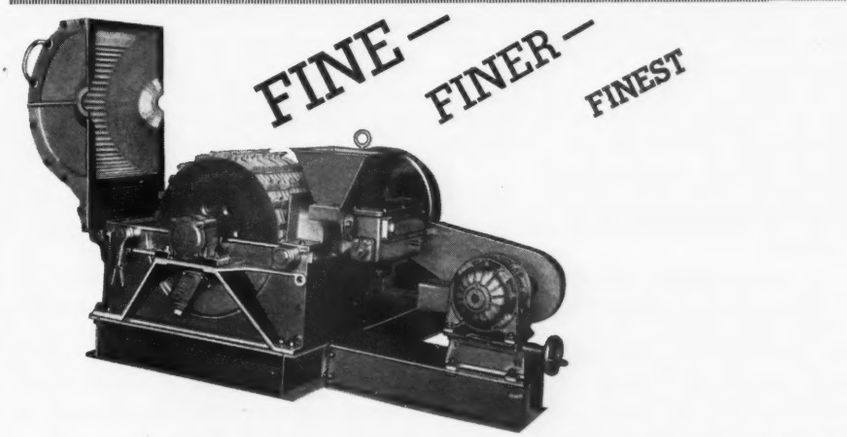
MORE CONTROLS—Almost everything will now be controlled from Washington. All exports are now subject to restriction, and require licenses for movement. Price ceilings are not yet numerous in the food field; but it is expected that price control will be voted in some mild form by Congress, perhaps in February. Import controls are also being established, particularly to stabilize prices of imported foods. It is not expected, however, that either labor or the farmers will be too closely supervised. Despite the radical measure which passed the House of Representatives December 3, a complete anti-strike bill does not seem very likely at mid-December. But when the first enthusiasm of patriotic response by labor to war declaration passes, there will probably have to be such a bill in order really to control strikes adequately.

LEND-LEASE PURCHASES—The purchases of Lend-Lease food are now reported to be at the rate of about one hundred million dollars a month. Where surpluses are available which can be safely stored, any such purchases will be put in the stockpile in order to continue to encourage primary production and industrial processing.

Even if plants cannot see their way clear to reach regular markets promptly with capacity output, it will be worthwhile to continue full production at least briefly while exploring the possibility of selling any surplus to the government for Lend-Lease purposes or for the enlarged "ever-normal granary."

PRICE PROTESTS—Well over 90 percent of all complaints which come to the Consumers Division of OPA relate to foods. The only close rival to these complaints is the broad one that "the cost of living is rising generally." The food complaints are both general and specific. In a recent period a tabulation shows the percentage distribution to include: 17.27 percent on food generally; milk, 14.18 percent; meat, 12.23 percent; eggs, 7.29 percent; dairy products other than milk, 6.99 percent; cereals and bakery products, 5.05 percent; sugar, 4.67 percent; fats and oils, 4.53 percent; coffee, 3.59 percent; canned fruits and vegetables, 3.38 percent; fresh fruits and vegetables, 3.02 precent.

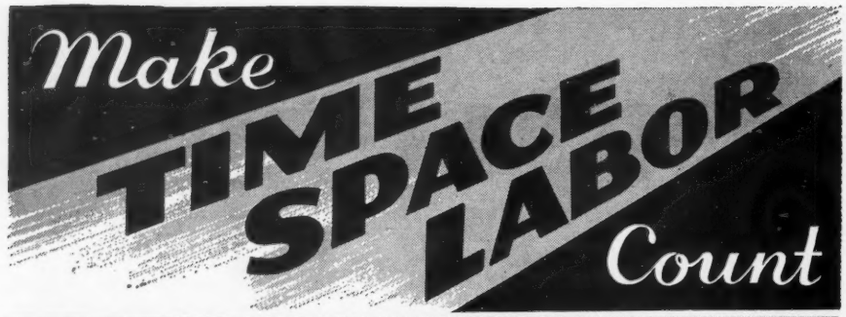
MAINTAIN SANITATION—Serious shortage is anticipated in the supply of certain disinfectants and other chemicals used for sanitary control at food plants. However, the government has no intention of letting this shortage make necessary any lowering of standards in the protection of health. Companies which cannot get usual supplies of disinfectants or cleansers should first seek to obtain other materials equally effective. Failing in that, they can also ask help of the Civilian Supply Section of OPM. That agency puts health and sanitary precautions even ahead of war material.



By simply changing the screen mesh on a *Robinson Super Screen Type Pulverizer* you can reduce practically any dry material to particles as coarse as sand or as fine as talc. The rotor and screen are of large diameter, carrying a maximum number of hammers which insures grinding to the finest grades at maximum capacity. . . . The machine is precision built throughout, equipped with ball bearings, and absolutely dust tight. In the food industries it is successfully pulverizing such materials as cereals, chocolate, spices, dehydrated vegetables, etc., into the uniform degree of fineness desired without rescreening. We are prepared to conduct grinding tests on the materials you want to pulverize, and advise exact results that can be secured.

For more complete details on these machines and other Robinson Grinders write us today for Catalog 36-E.

ROBINSON MFG. COMPANY
71 PAINTER STREET **MUNCY, PA.**



"CONVEYORIZE" Your Handling...

Saving valuable time—using plant space more effectively—releasing manpower for more productive work—Standard Conveyor engineers have proved these benefits for hundreds of manufacturers—and can do the same for your company. Here are typical examples:

". . . found that we saved 150% of the cost of the conveyor in handling this one cargo of pulp as against the cost of unloading previous cargoes."—from the report of a prominent paper mill.

"We believe that due to the present arrangement of our compound department, including conveyors, we have gained approximately 65% floor or storage space, and showed a saving in handling costs of 56%."—a nationally known rubber manufacturer.

". . . one of the greatest time and labor saving devices we have ever used—paid for itself in less than 12 months."—statement of prominent food manufacturer.

". . . we selected your type of roller conveyor . . . because we felt that the contour of your steel roller is very favorable to the transportation of shells which have a finish turned copper band on them. The concave roller gives the band a two-point contact and consequently reduces the liability of damage by over 50% over what it would be if the rollers were straight or just slightly concave."—report from large armament plant where Standard Conveyors are used for fast, safe "line" production of 3 inch A. A. shell.

Call In a Standard Conveyor Engineer

—Check with him to see how Standard Conveyors can aid you to make men and machines more productive in your plant. Write for bulletin FI-1 "Conveyors by Standard"—a valuable reference book on conveying, containing data on many representative installations.

STANDARD CONVEYOR COMPANY

General Offices: North St. Paul, Minn.

Sales and Engineering Offices in Principal Cities

CONSTRUCTION NEWS

	Pending (thousands)	Awarded December (thousands)	Total Awarded 1941 (thousands)
Bakery	$50	.....	$4,085
Beverages	290	$266	8,339
Canning and Preserving	415	40	699
Cold Storage Plants	90	.....	780
Confectionery	40	.....	368
Grain Mill Products	290	50	6,784
Ice Manufactured	.....	.....	310
Meats and Meat-Products	80	40	2,178
Milk Products	405	374	3,213
Miscellaneous	535	164	7,104
	$2,195	$934	$33,860

Standards Issued For Dietary Food

When food is sold for dietary use, label must tell its value. Vitamin requirements listed

DIETARY food labeling regulations have been issued, along with a general regulation interpreting the term "special dietary uses" as used in the statute. And a comprehensive statement was issued simultaneously by Federal Security Administrator McNutt. Significant comments in his statement were these:

"Any food, whether general or special purpose, may be represented for special dietary uses, and . . . when so represented, or when it is otherwise purported to be for such uses, the label should bear full information as to its value for those uses. . . "

The following table represents the minimum daily requirements of vitamins and minerals for the purposes of these regulations:

Vitamin or Mineral	Infant (Under 1 yr.)	Child (1 to 6–6 to 12)	Adult (Over 12 yrs.)
U.S.P. units	unless	otherwise	indicated
Vitamin A	1,500	3,000	4,000
Vitamin B_1	83	167–250	333
Vitamin C	200	400	600
Vitamin D	400	400	400
Vitamin G	½ mg.	.....	2 mg.
Calcium	.....	750 mg.	750 mg.*
Phosphorus	.....	750 mg.	750 mg.*
Iron	.....	7½–10 mg.	10 mg.**
Iodine	.....	1/10 mg.	1/10 mg.

* 1,500 mg. for pregnant or lactating woman.

** 15 mg. for pregnant or lactating woman.

The effective date of the order is "from and after" May 17, 1942.

Fish Demand Promoted

USE OF over 750,000 lb. of fish per week in feeding the armed forces of

the United States affects the fishery industries of the country in two ways. First, with a reduced fishing fleet available, and civilian demand on a definite upgrade, it indicates that a firm market and higher prices, accompanied by restricted supplies, will probably continue throughout the war.

Second, it is likely that many men in the Army and Navy who have never eaten fish before will come to like it. After the war is over, it is quite likely that these men will continue to demand fish, thereby increasing the general per capita demand for fish throughout the country, opening new and larger markets for the industry.

Far Eastern War Cuts Sugar Shipments

INTERFERENCE with shipments from the Philippines and Hawaii are likely to cut United States sugar supplies from customary sources by somewhere around 2,000,000 short tons, raw value. Some of this will no doubt be made up by increased imports from Latin America and the West Indies, as well as by increase in domestic cane and beet sugar production. Another factor in the situation is that sugar consumers in the United States consistently built up inventories during 1941, the amount of such excess purchases being estimated in the neighborhood of 700,000 tons.

In spite of these various increases, it is likely that sugar supplies in 1942 will be tighter than for some years past. And in 1943, unless the Russian situation changes greatly for the better, the shipment of sugar to Russia is likely. Of course, the government has already closely restricted sugar sales to immediate needs. But it is quite possible that even closer restrictions will be made in the future.

Increase in Fruit Yield Expected to Slacken

PRODUCTION of grapes and other fruits has increased greatly in the United States during the past ten years, according to figures of the Department of Commerce. But numbers of trees planted and not yet bearing indicate that the rate of increase will slacken over the next few years. One of the accompanying tables shows increases in the ouput of various fruits between 1930 and 1940. The other table compares the number of trees and vines under bearing age in the two years.

Grapefruit production increased fourfold and orange production increased over 60 percent in the ten year period. Other principal fruits also showed good increases. On the whole, fruit production increased much faster than did population. But the comparison of trees under bearing age indicates a slackening in output increase for all fruits except peaches.

Increase in Fruit Output 1930 to 1940

(000 omitted)

Fruit	1930	1940
Grapefruit, tons....	312	1,236
Oranges, tons.....	1,689	2,873
Grapes, tons.....	1,942	2,295
Apples, bu.	126,433	150,093
Plums, bu.	20,038	25,646
Pears, bu.	18,500	24,981
Peaches, bu.	42,827	56,577
Cherries, lb.	227,754	310,397

Trees and Vines Under Bearing Age 1930-1940

(000 omitted)

Fruit	1930	1940
Grapefruit, trees....	4,128	867
Oranges, trees	7,595	4,542
Grapes, vines.....	24,653	18,514
Apples, trees.....	27,455	13,511
Plums, trees.....	4,514	3,096
Pears, trees.....	5,228	2,046
Pearches, trees.....	20,134	21,720
Cherries, trees.....	4,615	2,664

Price Ceiling Threat Steadies Commodities

OUTBREAK of actual war between the United States and the Axis caused less disturbance of food commodity prices than had been expected. With a price ceiling already fixed for sugar and limitation immediately forthcoming for certain other food commodities, the commodity markets were much steadier than in 1939, when Germany invaded Poland.

The general weekly commodity index of the *New York Journal of Commerce* rose from 96.3 on November 15 to 97.8 on December 13, 1941. The same publication's food price index rose from 92.1 to 94.5, while the grain price index rose from 84.1 to 92.6.

Spot prices of food commodities for the month from November 13 to December 13, 1941, show some definite jumps upward. Wheat, No. 2, hard winter, Kansas City, went from $1.11¼ to $1.20½. Corn, No. 3, yellow, Chicago, rose from 71c. to 77c. Flour upped from $6.15 to $6.55. Beef went from 16½c. to 20c., and lamb from 18½c. to 22c. In contrast, pork loins fell from 21½c. to 20c. Lard rose slightly, from $10.40 to $10.50. Eggs were steady at 37½c., while butter fell from 37¼c. to 35c. Cheese was unchanged at 25¾c. Ceilings placed over imported sugar, coffee and cocoa have established stable prices. Cottonseed oil was also stabilized by government regulation. Canned foods were steady, except canned salmon, which jumped from $3.50 to $3.75.

IT'S WISER TO PROTECT SHINY SURFACES
IT PAYS to be careful about the cleaner used and thus avoid replacing expensive equipment. You can clean thoroughly yet safely with Metso*. And that is due to the unique silica (SiO_2) content in Metso which balances the cleaning action and protects against chemical attack.
Metso Balanced Cleaners give quick action in emulsifying fats, oils and grease, and rinse them away completely. There's no re-settling of removed dirt on the cleaned surface. Investigate Metso now before the shine wears off your equipment.
*A special cleaner in liquid form is available for tin and aluminum. Details on request.
PHILADELPHIA QUARTZ COMPANY
EST. 1831
General Offices: 125 S. Third St., Phila., Pa. Chicago Sales Office: 205 W. Wacker Drive. Stocks in 60 cities. Sold in Canada by National Silicates Ltd., Toronto.
METSO
METSO CLEANERS

INDICATORS

Flour production in November, 1941, as reported by The *Northwestern Miller* for mills producing 65 percent of United States output, was 5,614,551 bbl., compared to 5,872,252 bbl. for the same mills in November, 1940.

Sugar deliveries, January through October, 1941, totaled 6,802,693 short tons, raw value, compared to 5,742,273 tons for the same period of 1940, an increase of over 19 percent.

Confectionery and competitive chocolate products sales in October, 1941, as reported by the Department of Commerce for the same 203 manufacturers, were $36,817,000, a 33 percent increase over sales in October, 1940, and 18 percent above the preceding month.

Fishery products, frozen, in cold storage on October 15, 1941, totaled 107,255,000 lb., 14 percent above the quantity in storage a year before and representing a 5 percent increase over the preceding month.

Shrimp pack is reported to be running 40 percent below normal so far this season.

Grapefruit production estimates for the current crop year have been raised and now total 41,490,000 boxes compared to 43,033,000 boxes in the 1940–1941 season.

Beans, green and wax, packed in 1941 are finally reported at 11,955,041 cases compared to 9,188,777 cases in 1940.

Beans, fresh lima, packed in 1941, totaled 2,303,671 cases, compared to 1,929,786 cases in 1940.

Asparagus pack, final figures for 1941, amounted to 3,027,213 actual cases, compared to 3,108,562 cases in 1940, and to 2,519,892 cases in 1939.

Soybean output, now estimated at 113,000,000 bu. for 1941, compares to 82,000,000 bu. in 1940 and to 93,000,000 bu. in 1939.

Oils and fats imported in September, 1941, were 141 percent above imports in the corresponding month of 1940. Imports of these products for the first nine months of 1941 totaled 1,374,000,000 lb., up 53,000,000 lb. from the preceding year.

Chickens hatched during November, 1941, are estimated at 21,929,000, a new high record for November, and 66 percent above November, 1940, production.

Egg production is running about 9 percent above the figures of a year ago.

Evaporated milk production in October, 1941, is reported by AMS at 269,320,000 lb., 56 percent above October, 1940, and 97 percent above the 1935–1939 October average.

Milk sales in October, 1941, are reported by Milk Industry Foundation to have been 4.8 percent over those of October, 1940.

Butter, creamery, produced in October, 1941, was 136,405,000 lb., 0.3 percent below production in October, 1940; but 7.6 percent over the 1930–1939 average for the month.

Butter, creamery, produced in the first ten months of 1941 totaled 1,667,550,000 lb., 4.7 percent above the production for the same period of 1940 and 14 percent over the 1930–1939 average for the period.

Cheese, American, produced in October, 1941, was 62,240,000 lb., up 30.3 percent from production in October, 1940.

Cheese, American, produced in the first ten months of 1941 totaled 618,945,000 lb., an increase of 16.8 percent over the figures for a like period of 1940.

Oleomargarine sales in October, 1941, as indicated by sales of internal revenue stamps, were 32,692,324 lb., compared to 29,707,754 lb. in October, 1940. Sales for the ten months of 1941 ending with October were 301,641,348, an increase of 16 percent over the preceding year.

Fruits, frozen, in storage on December 1, 1941, totaled 185,431,000 lb., compared to 154,733,000 lb. on December 1, 1940, and to an average of 128,491,000 lb. for the date in 1936–1940.

Vegetables, frozen, in storage on December 1, 1941, amounted to 99,197,000 lb., compared to 84,155,000 lb. a year before.

Butter, creamery, in storage on December 1, 1941, was 152,526,000 lb., compared to 67,598,000 lb. a year before and to an average for December 1 in 1936–1940 of 94,614,000 pounds.

Cheese, all kinds, in storage on December 1, 1941, amounted to 188,225,000 lb. The quantity a year before was 137,389,000 lb. and the average for December 1 in 1936–1940 was 120,212,000 pounds.

Eggs, case equivalent, in storage on December, 1, 1941, amounted to 5,368,000 cases, compared to 4,577,000 cases on December 1, 1940, and to an average for December 1 in 1936–1940 of 4,422,000 cases.

Poultry, frozen, all kinds, in storage December 1, 1941, was 172,436,000 lb., compared to 159,110,000 lb. a year before and to 132,595,000 lb. average for the date in 1936–1940.

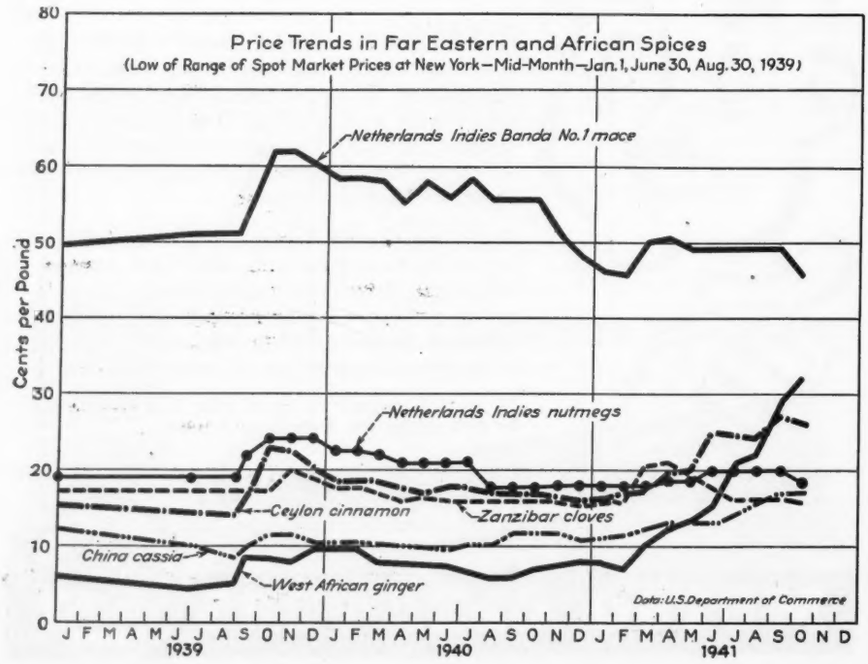
Meat, all kinds, in cure and storage on December 1, 1941, totaled 546,970,000 lb. The figure a year previous was 550,407,000 lb. and the average for December 1 in 1936–1940 was 513,029,000 pounds.

Lard in storage December 1, 1941, was 172,027,000 lb., and rendered pork fat on the same date totaled 4,896,000 lb. The combined figures for these two products on December 1, 1940, were 232,472,000 lb., and the average December 1 figure in 1936–1940 was 107,731,000 pounds.

Weekly wholesale food price index of Dun & Bradstreet stood at $3.37 on December 9, 1941, compared to $2.49 on the corresponding 1940 date.

Business activity index of *Business Week* stood at 164.4 on December 6, compared to 161.1 a month before and to 141.3 a year before.

Cost of living index of National Industrial Conference Board in November, 1941, was 92.9, up 1 percent from the figure of November, 1941, and 8.7 percent above the November, 1940, figure.


Price Trends in Far Eastern and African Spices
(Low of Range of Spot Market Prices at New York—Mid-Month—Jan. 1, June 30, Aug. 30, 1939)
Cents per Pound
80
70
60
50
40
30
20
10
0
Netherlands Indies Banda No. 1 mace
Netherlands Indies nutmegs
Ceylon cinnamon
Zanzibar cloves
China cassia
West African ginger
Data: U.S. Department of Commerce
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1939
1940
1941

Watch Your Water Supply

(Continued from page 50)

tinned cans and nickel-lined equipment. Foods which have picked up iron and copper particles blacken in tinned containers. Chlorinated waters are destructive to citrus products, particularly orange drinks, and must be treated carefully by carbon filters. Waters which are naturally alkaline will attack tin surfaces, causing etching or spangling. Waters high in chlorides and sulphates or excessively chlorinated, are likewise corrosive to tinplate. The use of chromate inhibitors is then desirable. Water from which temporary hardness is precipitated onto cans during sterilization and cooling necessitates buffing of can surfaces to impart brightness to them. Scale of this type in cooling waters can easily be minimized by the use of small quantities of metaphosphate.

The economic effects of water hardness are, of course, great. Of all the causes of boiler failure, water is perhaps the greatest. Polished steel or other metal surfaces readily show the spotting effects of hot hard water when they dry. Maintaining surfaces of steel in shiny condition in a milk plant, for example, requires considerable effort, and expense. The introduction of wetting agents for water has decreased tremendously the significance of this problem. Perhaps in passing it is important to note that while the insulating effect of scale in boilers is well known, the same effect of scale on sterilizer or vat thermometer stems is often disregarded.

Every supply of water is a problem unto itself. Practices that may improve water supplies for food processing activities and which may be advantageously incorporated in part are: Aeration to remove sulphur, oxidation and precipitation of iron, precipitation of temporary hardness, chlorination, filtration to remove turbidity, adsorption to remove odors, removal of oxygen and chlorine, adjustment of reaction, complete removal of hardness and adjustment of corrosiveness.

Doubles Refrigerating Capacity

(Continued from page 65)

to discover and correct the operating difficulties which came up. The need for the before-mentioned electrical interlocks and warning siren was discovered during the trial period.

Those difficulties were so completely eliminated that the refrigerating system was operated during the extremely hot and dry summer of 1939 to carry the entire load with only the two steam-operated compressors. The 3-cylinder 9x9 in. electrically driven compressor was kept for standby purposes only. After more than a year of operation of the revamped refrigerating system the standby unit had not been needed.

That statement holds even though during the spring of 1940 a 3-story 165x68 ft. addition, calling for approximately 39 tons of increased refrigerating capacity, was made to the existing plant.

Obtaining that increased efficiency in operation of the refrigerating equipment resulted because the compressors were kept free of liquid ammonia and given an opportunity to function as compressors of gaseous ammonia instead of as gas and liquid ammonia pumps. An indication of the change in conditions was found in the 260 deg. F. temperature of the compressor discharge lines which had previously become heavily covered with frost. Also, the cooling-water centrifugal pump had to be increased from the 4-in. to the 6-in. size to get the compressed ammonia effectively liquefied.

Another Improvement

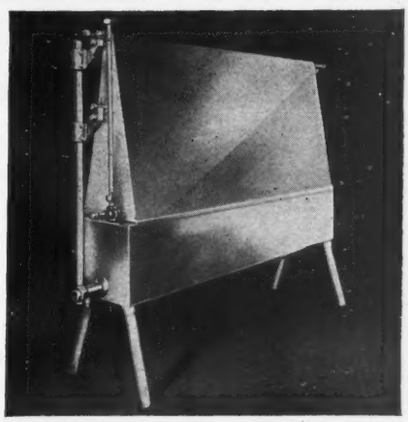
Later operating experience showed the temperature in the discharge lines to be too high for good practice. The condition was corrected by connecting $\frac{3}{8}$-in. liquid ammonia lines into the compressor discharge lines to draw in small quantities of liquid ammonia to reduce the discharge temperature to about 200 deg. F. Under winter operating conditions the pressure in the discharge lines is approximately 95 lb. per square inch, and in the summer it is about 150 lb. per square inch. A subsequent addition to the plant in 1941 involving even greater demand for refrigeration has necessitated enlargement of the cooling tower to get the required volume of cooling water.

Before the changes were made all three compressors were able to deliver only about 130 tons of effective refrigeration. After the change, the two steam-driven compressors were able to operate at their rated capacity of 195 tons, at least, with a 90-ton capacity compressor available as a standby unit, an increase of more than 100 percent in effective refrigerating capacity.

Having this 90-ton standby unit available has made possible a 1941 addition to the plant of approximately 30,000 sq. ft. of floor space. This addition necessitated the enlargement of the water-cooling tower. Otherwise, no change in the revamped refrigeration system was necessary to meet the demand of this increased plant area.

CHESTER

WATER COOLERS



. . *for beverage plants*

Electric refrigeration using freon and methyl chloride has widened the field for surface type water coolers to such an extent that we now make them for use with these gases to serve the needs of small as well as large bottlers. Furnished with or without covers. Made of tinned copper, aluminum or stainless steel.

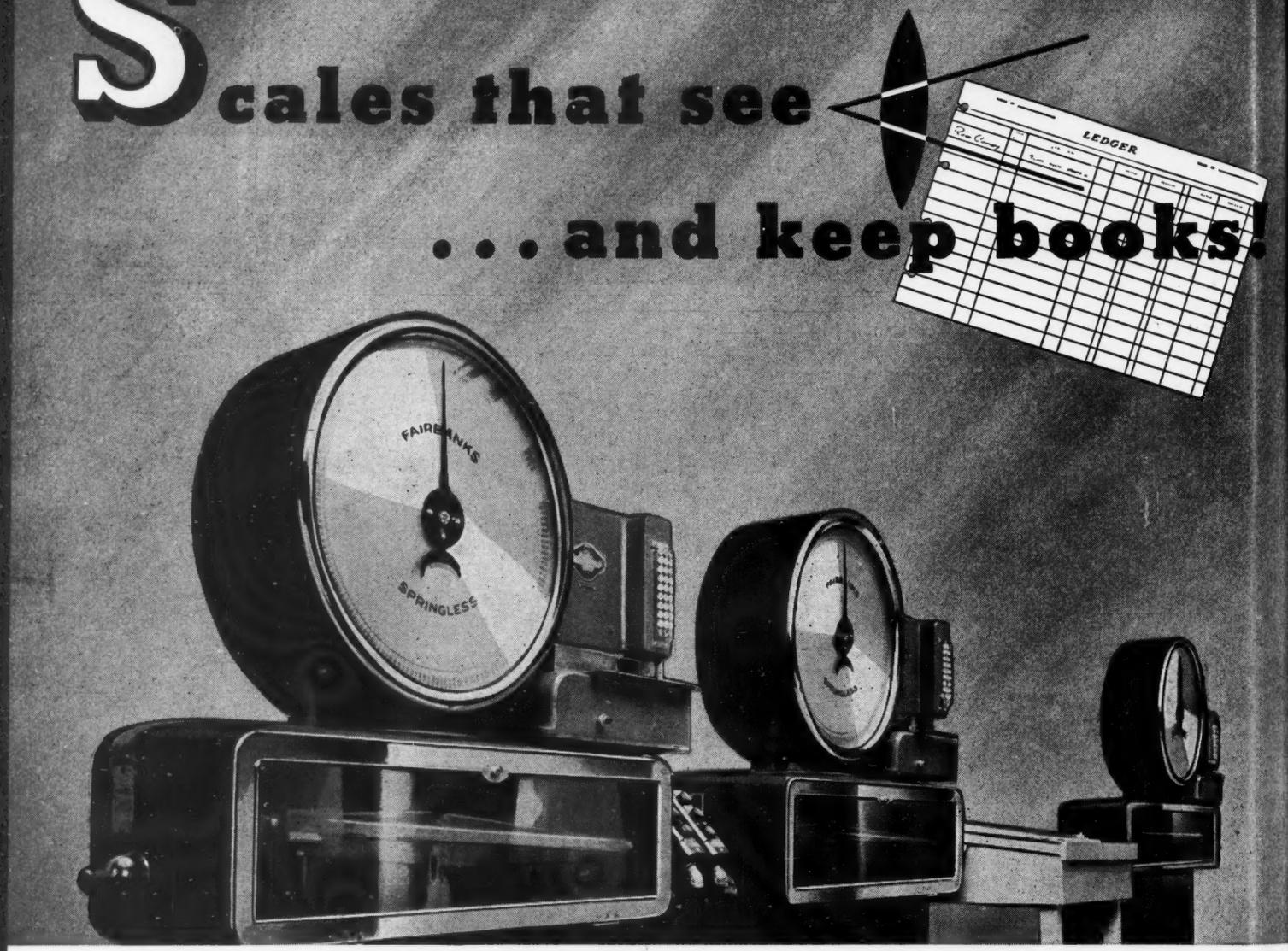
Chester construction has been a standard of quality for the past 30 years in the Dairy Industry.

Write for full details.

CHESTER DAIRY SUPPLY COMPANY

9th & Hyatt Sts. ***Sanitary Heat Exchangers*** **Chester, Pa.**

Scales that see ... and keep books!



IT costs money to be inaccurate with "tonnage"—and it costs more money to be s-l-o-w.

In one of the most modern coal preparation plants in the world, Elkhorn Coal Company, Wayland, Ky., you will find a battery of the most modern scales handling "tonnage" at high speed.

These Fairbanks Scales with "electric eyes" shut off flow to hoppers automatically when the pre-set weight is obtained. A printed record is made of each operation automatically, and an ingenious keying system credits the tonnage to the man who mined it.

To make errors in weighing well-nigh impossible, to fit weighing speedily into the production flow, to protect alike the buyer, seller, and all whom weighing affects is the aim of this, the most experienced and most modern organization of scale makers.

There are Fairbanks Scales in types for your every weighing need... and Fairbanks Scale Engineers are available at your call.

Fairbanks, Morse & Co., Dept. A-209, 600 S. Michigan Ave., Chicago, Illinois. Branches and service stations throughout the United States and Canada.

We Want To Help You

It is our desire to do everything we can to aid in the speed-up of American production. Our scale engineers can possibly suggest new and more efficient use of your present scales or modification which will expand their capacity.

FAIRBANKS·MORSE SCALES

DIESEL ENGINES ELECTRICAL MACHINERY RAILROAD EQUIPMENT WASHERS-IRONERS STOKERS
PUMPS MOTORS WATER SYSTEMS FARM EQUIPMENT AIR CONDITIONERS

MEN · JOBS · COMPANIES

INDUSTRY

Bangor-Freestone Cider and Vinegar Co., Inc., Bangor, Mich., has been organized to manufacture cider, pickles and food products.

Birds Eye Frosted Foods Co. is now quick freezing broccoli and spinach at Ponchatoula, La., at the plant of Marion Fannelly, Inc. Quality control and freezing methods exclusive to Birds Eye have been instituted at the plant.

Coble Dairy Products Co., Inc., plans to build a $125,000 plant for producing condensed and powdered milk at Wilkesboro, N. C., and will also spend $20,000 in enlarging and improving its plant at Lexington, N. C.

J. E. Decker & Sons Packing Co. have let contract for a $94,000 cannery at North Chicago, Ill.

Peter Faerber & Sons Co., Newport, R. I., have announced plans to build a 2-story, 50x120-ft. bottling plant in that city.

Georgia Bakers Association, Atlanta, Ga., has voted to change its name to Georgia Bakers Council. E. P. Cline, Columbus, Ga., was re-elected president.

Health City Beverage Co., Battle Creek, Mich., has been organized to handle beer and soft drinks.

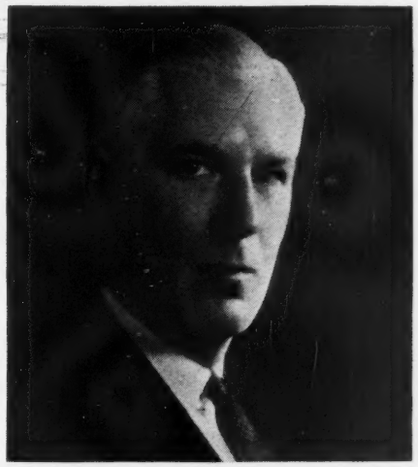
Henningsen Denison, Inc., has been organized in Denison, Tex., for permanent operation of an egg breaking plant. Henningsen Bros. has been operating a part time plant in that city since 1934, with more than 3,000 cases of eggs broken daily.

S. A. Moffett Co., Seattle, Wash., is erecting a reinforced concrete quick freezing and storage plant at Grandview, Wash., to cost between $35,000 and $40,000. The 2-story fireproof plant, 110x90 ft., will be completed by March 1. C. C. Andrews will be superintendent.

Nolensville (Tenn.) Cooperative Creamery is considering erection of a cheese plant in that town to be operated in connection with the present butter manufacturing plant. The proposed addition will cost $15,000.

Pacific Glucose Refinery Co., South Westminster, B. C., will commence operation in the middle of January. Construction of the plant, originally scheduled to open in 1941, was delayed through difficulty in getting materials.

Pacific Meat Co., Ltd., Vancouver, B. C., has awarded contracts for the construction of an extension to its plant in that city, at a cost of $18,000. In addition to the plant extension, a 2-story concrete building 75x72 ft., the company will erect seven new smokehouses.



R. E. PEARSALL

R. E. Pearsall, vice-president of Armour & Co., has been elected president of American Butter Institute. Vice-president is G. W. McLatchey, who is vice-president of American Dairies, Inc., Kansas City, Mo.

JULIUS F. MULLER

Borden Co. has acquired the Muller Laboratories, Baltimore, Md., producers of "Mull-Soy," a milk substitute for use of persons allergic to the proteins of cows' milk. Dr. Muller will continue as manager.

Ralston-Purina Co., has begun operation of its new $25,000 mill in Omaha, Neb., which includes a 6-story grain elevator. D. R. Arends has been named manager.

Silvers & Danchers, Union City, Ind., has begun a new powdered egg industry at Wayland, Mich., making 15,000 lb of dried whole egg powder daily. The entire output will be sold to the British Ministry of Supplies under the Lease-Lend program.

Virginia Pepsi-Cola Bottling Co., Inc., of Charlottesville, Va., with a maximum capital of $100,000, has been chartered to do a manufacturing and bottling business.

Warwick Club Ginger Ale Co., West Warwick, R. I., has purchased 22 acres of land where construction will soon begin on a $150,000 beverage processing plant.

Waverly (Iowa) Beet Sugar Co. will spend from $75,000 to $125,000 for improvements and additions to its plant.

PERSONNEL

William F. Allen, technical director of the Herty Foundation Laboratory since 1939, has resigned to become associated with the A. E. Staley Manufacturing Co., Decatur, Ill.

John Brandt, resident manager of Land O'Lakes Creameries, Minneapolis, has been elected president of National Cooperative Milk Producers Federation, replacing **N. P. Hull** of Lansing, Mich.

Max F. Burger, executive secretary of National Confectioners Association since 1933, has submitted his resignation.

Frank R. Day, former president of the Oregon chapter of American Society of Bakery Engineers, has opened a business of his own in North Bend, Ore.

W. G. Epstein, formerly chief chemist and supervisor of production for B. A. Eckhart Milling Co., Chicago, Ill., heads the technical department of the flour and milling division of Doughnut Corp. of America, Ellicott City, Md.

E. D. Fear, president of the De-Raef Corp., mineral milk products, has been elected chairman of the board. **I. E. Fear** succeeds him as president, and **Walter L. Murphy** becomes vice-president.

G. M. Ferguson has been appointed comptroller of British Columbia Packers, Ltd., Vancouver, B. C., and **Arthur Hamilton** has been appointed secretary-treasurer.

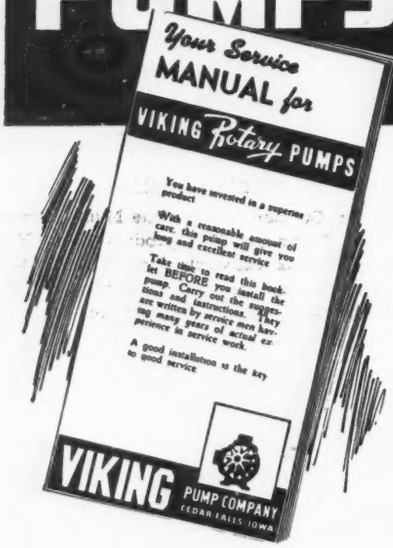
Fred Feutz, former field man for the Federal Bureau of Dairy Industry, now heads field work on swiss and limburger cheese for Lakeshire-Marty Co., division of the Borden Co.

Burt P. Flickinger, Buffalo, president of S. M. Flickinger Co., Inc., will be named head of the food distribution advisory committee, OPM.

Neil Harty, formerly with Stacy-Scott,

This Little Booklet..

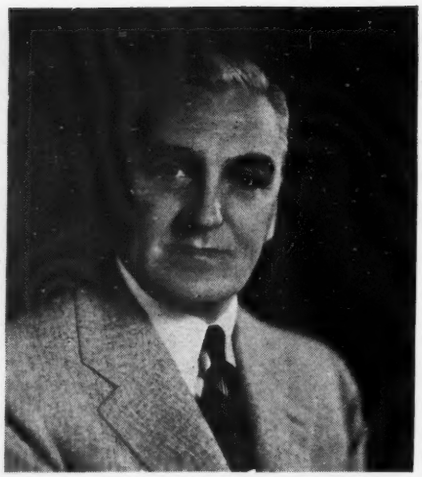
MAY Save YOU TIME, MONEY and PUMPS


Your Service MANUAL for
VIKING Rotary PUMPS
You have invested in a superior product
With a reasonable amount of care this pump will give you long and excellent service
Take time to read this booklet BEFORE you install the pump. Carry out the suggestions and instructions. They are written by service men having many years of actual experience in service work.
A good installation is the key to good service
VIKING PUMP COMPANY
CEDAR FALLS, IOWA

When pumps are hard to get it's wise to take good care of the ones you have. The Viking Service Manual is a handy, illustrated booklet that tells you how to get utmost performance out of Viking Rotary Pumps. It explains and pictures correct installation . . . shows you how pumping efficiency may be stepped up . . . suggests how some repairs and replacements may be avoided.

Gain valuable help in your pumping operations by consulting the Viking Service Manual. It is offered to you FREE. Your request for a copy will be filled by return mail.

VIKING PUMP CO.
CEDAR FALLS, IOWA



LESTER W. BERMOND

Swift & Co. has announced the appointment of Lester W. Bermond as manager of the Chicago plant, succeeding Eugene A. Moss, now a vice-president. Mr. Bermond has been with the company since 1912.

HAROLD S. MITCHELL

H. S. Mitchell is new chief chemist of Swift & Co., succeeding R. C. Newton, elected to vice-president in charge of research. As assistants he has chosen H. E. Robinson, H. H. Young and C. C. Ziegler.

wholesale fruit company in Lincoln, Neb., has been named manager of the Lincoln branch of the Gamble-Robinson Co., with headquarters at Minneapolis, Minn.

Don M. Hemb, Elgin Milk Products Co., Chicago, is 1942 president of the Chicago Society of Dairy Technologists. Vice-president is **E. C. Scott,** Swift & Co., Chicago.

Maurice Holland, former director of the division of engineering and industrial research, National Research Council, has been appointed research advisor to Pillsbury Flour Mills Co.

Carl Marty, Jr., who has retired as president of the Lakeshire-Marty Co., Monroe, Wis., recently opened a large cheese cold storage plant in Monroe.

Otto Richter has become manager of Richter Baking Co., Corpus Christi, Tex. He has been production superintendent of the three Richter plants and is president of Texas Bakers Association.

Walter L. Sams, Coca-Cola Co., Richmond, Va., is 1942 president of Virginia Manufacturers of Carbonated Beverages.

William A. Scott has been appointed Buffalo manager of Libby, McNeill & Libby, succeeding **Percy J. Asendorf,** who has been transferred to New York as executive assistant to the manager of the New York division.

C. N. Shepardson, head of the dairy husbandry department, Texas A. & M., has been appointed to the Inter-American Committee for the Dairy Industries in the field of dairy husbandry.

O. O. Smaha, formerly vice-president and assistant treasurer of Borden-Wieland division of Borden Co. in Chicago, Ill., has been elected executive vice-president.

Frederick V. Waugh has been appointed assistant director of marketing, U. S. Department of Agriculture. He was formerly chief of the division of marketing and transportation research of the Bureau of Agricultural Economics.

DEATHS

Arthur U. Chaney, 67, manager of American Cranberry Exchange, Dec. 2, in New York.

Preston Herbert, 70, president of the Cary Maple Sugar Co., St. Johnsbury, Vt., Nov. 28, in New York.

William W. Hovey, 63, member of Hovey, Stanter & Co., milk products dealers, and former manager of Dairymen's League Cooperative Association, Dec. 10, in New York.

John C. Ketcham, 69, former president of National Sugar Beet Growers Association, Dec. 4, in Hastings, Mich.

Edward J. Lawler, 61, president of Keeley Brewing Co., Chicago, Nov. 25, in Chicago.

Burt W. Miller, 62, former New York State Milk Board executive, Nov. 30, in Lakeland, Fla.

Raymond Phillips, 68, secretary since 1910 of International Apple Association, Dec. 5, in Kingston, Ont.

S. Frederick Taylor, 80, one-time president of Borden Co., Nov. 26, in Jackson Heights, N. Y.

Junius P. Yates, 58, manager of the Harrison plant of Swift & Co. at Kearny, N. J., Dec. 4, in New York. Mr. Yates was also president of the Harrison By-Products Co.

Louis Young, 75, former manager of the Stockyards Packing Co., Chicago, Dec. 7, in Chicago.

ASSOCIATED INDUSTRIES

American Society of Refrigerating Engineers recently honored William S. Shipley, past president, with its Distinguished Service Award for his development of the "York Plan" coordinating industry and defense.

Gardner-Richardson Co. reports the death of Wilbur Stewart LaRue, vice-president in charge of purchases, on Thursday, Nov. 20.

Kold-Hold Manufacturing Co., Lansing, Mich., has opened a branch office in New York City to serve eastern customers with the firm's line of refrigerated plates.

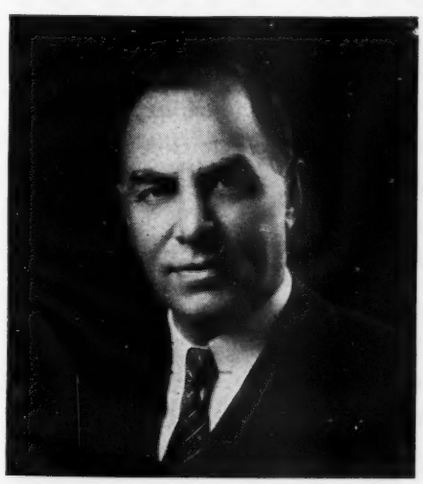
Liquid Carbonic Corp. has elected P. F. Lavedan as president to succeed C. G. Carter, who has become chairman of the executive committee.

Merck & Co., Rahway, N. J., announces that H. G. Obermeyer, leading cereal chemist, has joined its research and development department, specializing in vitamin-utilization and other materials in cereal products.

Monsanto Chemical Co., St. Louis, will construct a $2,200,000 plant to produce chemicals near Galveston County, Tex.

Olean (N. Y.) Glass Co., Inc., subsidiary of Thatcher Manufacturing Co., Elmira, N. Y., has moved its executive and general offices to Elmira to bring to its customers the service, research, and manufacturing technic of Thatcher Co.

Owens-Illinois Glass Co., Toledo, Ohio, is constructing a $1,000,000 glass container factory near Waco, Tex. At the start of operations next summer the factory will produce from 90 to 100 tons of glassware daily.



WILLIAM R. HAINSWORTH

Dr. William Hainsworth, vice-president in charge of engineering of Servel, Inc., and national authority on refrigeration research, has been elected president of American Society of Refrigerating Engineers.

*Electricity at 1c per kilowatt-hour**—a reduction of one-half to three-fourths the usual cost through other sources! That's the possibility brought to you by modern "Caterpillar" Diesel Electric Sets—a development by the world's largest manufacturer of Diesel engines. "Caterpillar" Diesel economy is being proved in hundreds of installations, in all sorts of establishments now making their own electricity with these completely self-contained, self-regulating, independent power-plants. For instance:

- A Massachusetts service station lops $75 a month off its electricity cost—and heats buildings besides.
- An ice-plant operator in Georgia estimates his annual saving at $1565, as compared with purchased power formerly used.
- A whole community in Oregon (21 residences, 4 stores, 1 hotel, and an auto camp) makes its own electricity on less than a gallon of 10c fuel an hour.

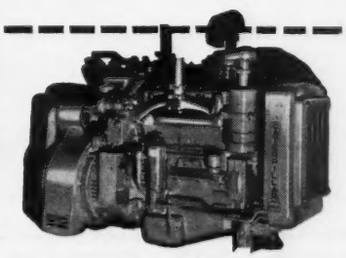
If *your* electric bills run $50 or over per month and you are paying 2 cents or more per kilowatt-hour, you can slash the cost with one of these economical, dependable, long-lived "Caterpillar" Diesel Electric Sets. MAIL THE COUPON.

*Slightly more or slightly less, depending on average load and local price of fuel.

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

ELECTRIC SETS *(15 to 90 kw.)*



CATERPILLAR TRACTOR CO., *Dept. F1-1*, Peoria, Ill.

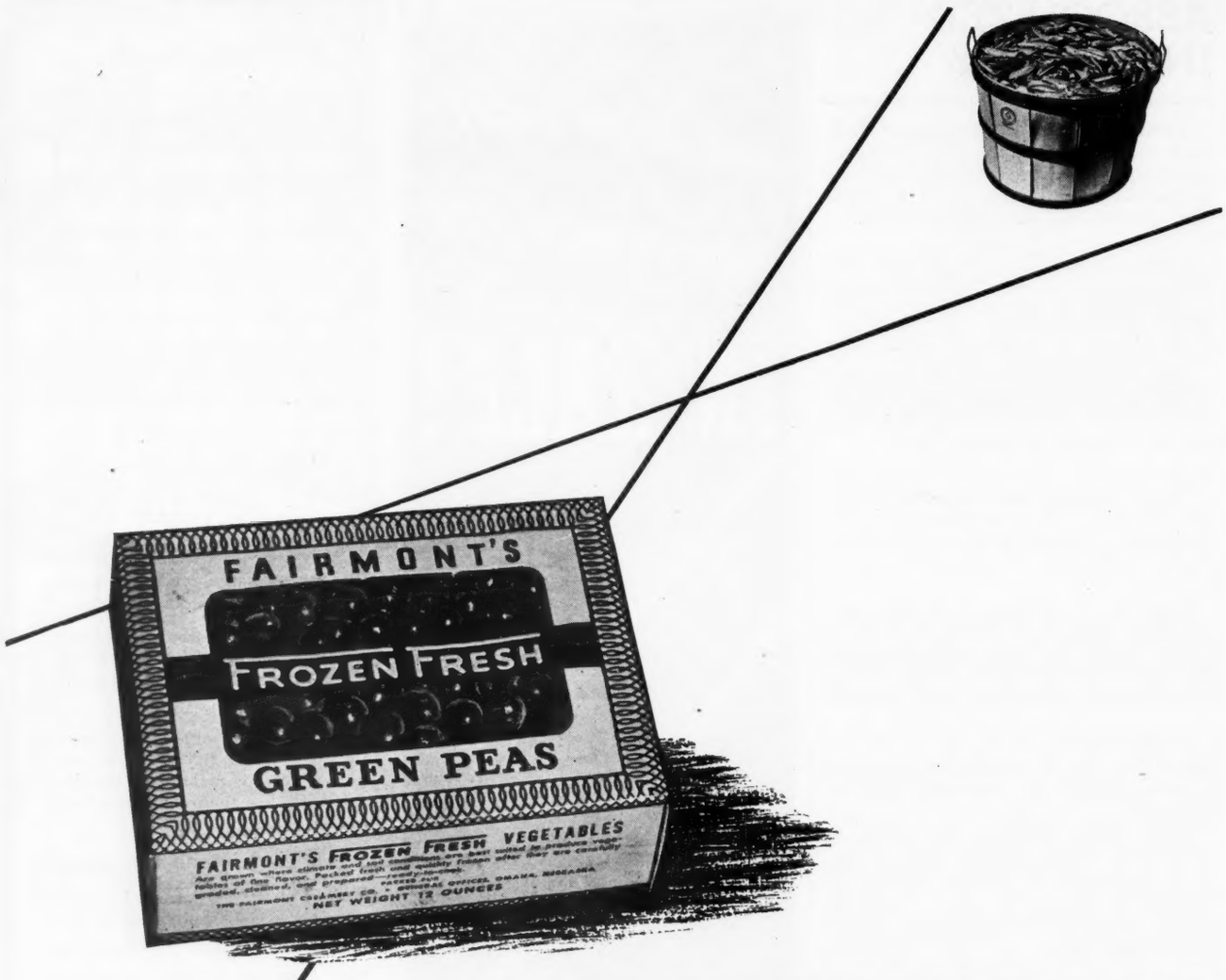
I want to know more about "Caterpillar" Diesel Electric Power and its low "1c per kw.-hour" cost.

*Name*_____

*Address*_____

My present power is costing about $_____ a month.

I require about_____kw. per hour for_____
(State kind of business)



GOOD FROZEN FOODS PACKAGING IS BASED ON *COLD FACTS!*

New facts dictated by size and quality of product, packing procedure, size of pack, shipping and display factors — the widest experience in other types of packaging won't help much in packing quick-frozen foods.

To present and prospective packers, Container Corporation offers the advice and assistance of a staff whose broad background in the frozen foods industry goes back to its beginning.

These men know the cold facts that can help you achieve the correct combination of product, package, freezing and distribution methods.

They are package engineers who have grown into quick-freezing specialists. Their suggestions may save you a lot of grief. Call our nearest office and arrange a consultation.

CONTAINER CORPORATION OF AMERICA

Corrugated and Solid-Fibre Shipping Cases • Folding Cartons • Boxboards

Chicago • New York • Rochester • Natick, Mass. • Philadelphia • Akron • Cincinnati • Cleveland • Circleville • Detroit • Indianapolis • Wabash Carthage • Anderson, Ind. • Peoria • Rock Island • Minneapolis • Seattle • Wilmington, Del. • Baltimore • St. Louis • Fernandina • Ft. Worth

NEW PACKAGES & PRODUCTS

The Pepper Mill Returns

BELIEVING that all whole spices should be freshly ground to insure the best flavor in seasoning food, Waldan Greenery, New York, N. Y., has brought out a pepper mill, available in oak wood or chromium, 3 in. high, filled with either black or white peppercorns. Connoisseurs who prefer their coffee and spices freshly ground will welcome the return of the pepper mill to grocery and gift-shop shelves to supplement the ready-ground and packaged spices.

Waldan Greenery is also marketing peppercorns in a rectangular glass bottle with a red lacquered metal cap.

Salty Soys

DIRECT APPEAL to the housewife is made by "Salty Soys," latest cocktail item introduced by Dewey Food Products, Chicago. Salty Soys (soybeans, coconut oil and salt) are marketed in an attractive 6-oz. glass re-use bowl with a pliofilm icebox cover.

Appetizing and easy to digest, Salty Soys appeared on the nation's food counters in time for the holiday trade.

Holland Honey-Cake

"FANCY HONEY-CAKE," a 14-oz. loaf cake baked and distributed by Holland Honey Cake Co., Holland, Mich., contains no fats, sirup or sucrose.

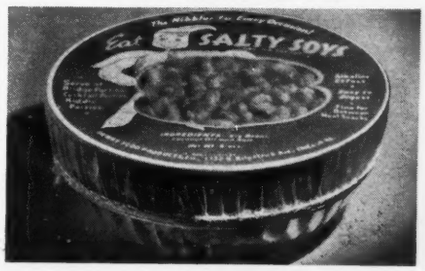
Made from rye flour, honey and buttermilk, the cake is said to be rich in vitamins, easily digestible, recommended as a nutritious food for convalescents and children in need of an energy builder. Honey-Cake was formerly eaten in Europe as a breakfast food. It can be served in buttered slices.

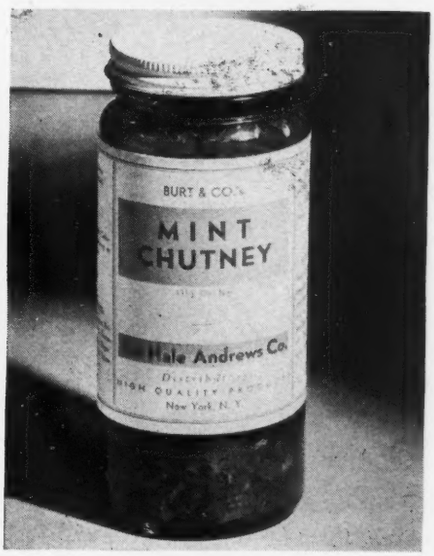
No Time, No Waste

A READY-MIXED BREADING for pan frying and deep-fat frying has been developed by Meletio Sea Food Co., St. Louis, Mo., for steaks, chops, sea foods, and so forth. "Golden Dipt" is the product of research and experimentation to find the right combination of materials for a breading that is neither a bread crumb nor cracker mixture.

In making Golden Dipt, the company used dough made from pure water, with all alkali removed, and three blends of soft winter wheat. The dough is baked at a temperature of 700 deg. F. in thin layers, ground and mixed with milk, eggs, sugar and salt. The product contains vitamins A, B and D, with small quantities of E and G. Baking at a high temperature is said to give Golden Dipt practical immunity against atmospheric conditions, eliminate such things as weevil germination, and carmelize the sugar content of the flour.

Golden Dipt is marketed in 10-oz. and 5-lb. packages, as well as 50-lb. and 100-lb. drums for commercial use.





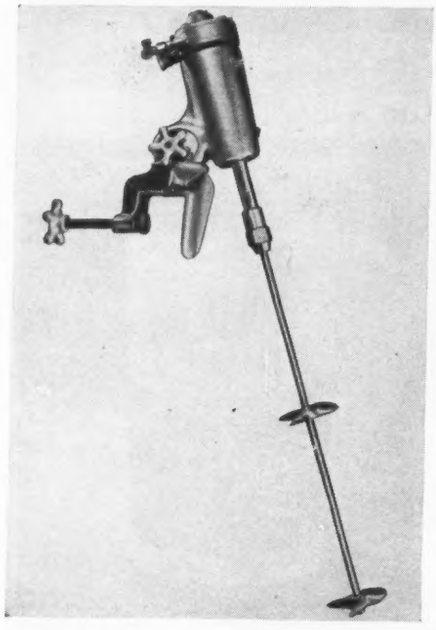
New Condiment

BURT & CO.'s mint chutney, distributed by the Hale Andrews Co., New York, N. Y., is made from a long used family recipe. The chutney, a quality product with no artificial coloring, flavoring or preservatives added, contains apples, peppers, raisins, onions, tomatoes, vinegar, sugar, mint, salt and spice.

FOOD EQUIPMENT NEWS

Air-Driven Mixers

MIXING EQUIPMENT Co., Rochester, N. Y., has added air-motored mixers to its line. The new mixers are of portable, propeller type, arranged to clamp onto the container or other vessel in which the mixing is done. At present, two models of these air-driven mixers are available. The AR-25 operates at 1750 r.p.m. and has a 36 in. shaft with a 3 in. propeller; while the AR-33 operates at



Air driven portable mixer.

400 r.p.m., has a 36 in. shaft and a 7 in. propeller.

These mixers are built for operation with air pressures from 60 to 120 lb., the optimum range being 70 to 90 pounds. Other features include quick removable shaft for easy cleaning; adjustable shaft length; and strong construction with extra ball bearing to remove whip-load from the motor bearing. A universal clamp permits the mixer to be used at any angle in the tank. Speed variation is obtained by throttling the air motor. In actual use, the speed of the air motor will also vary with the load and with variations in air pressure, a definite advantage in some cases.

Pipe Coil Saves Space

AN UNUSUAL PIPE COIL, for cooling an air blast, has been constructed by Frick Co., Waynesboro, Pa. This coil is said to be typical of advances made in the construction of coils, largely through progress in the arts of pipe bending and welding.

Occupying a space but 8 ft. 10 in. long by 7 ft. $1\frac{1}{2}$ in. wide and 5 ft. $10\frac{7}{8}$ in. high, this coil contains 5,500 ft. of 1-in. full weight black steel pipe, a 16-in. accumulator, large headers and ample stands. It is arranged with alternate sets of coils staggered, so that the air blast, in passing through, cannot short circuit. In operation, it cools 15,000 cu.ft. of air per minute from 32 deg. F. to 15 deg. F., operating with a refrigerant evaporating temperature of 10 deg. F.

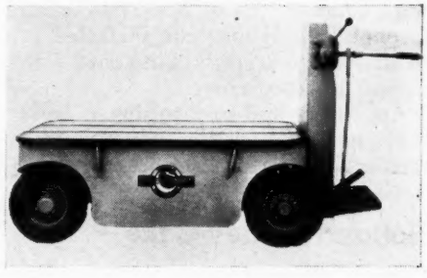
Thiamine Tester

A NEW instrument, a Fermentometer for the determination of thiamine (vitamin B_1), is now being made by American Instrument Co., Silver Spring, Md. Originated in the Fleischmann Laboratories of Standard Brands, Inc., this device offers a means of thiamine determination by a speedy, simple and accurate yeast fermentation method. The maker states that the instrument can be applied successfully to all foods, many biological fluids, plant and animal studies, and metabolic studies. With it, five different or similar samples and the control can be run simultaneously.

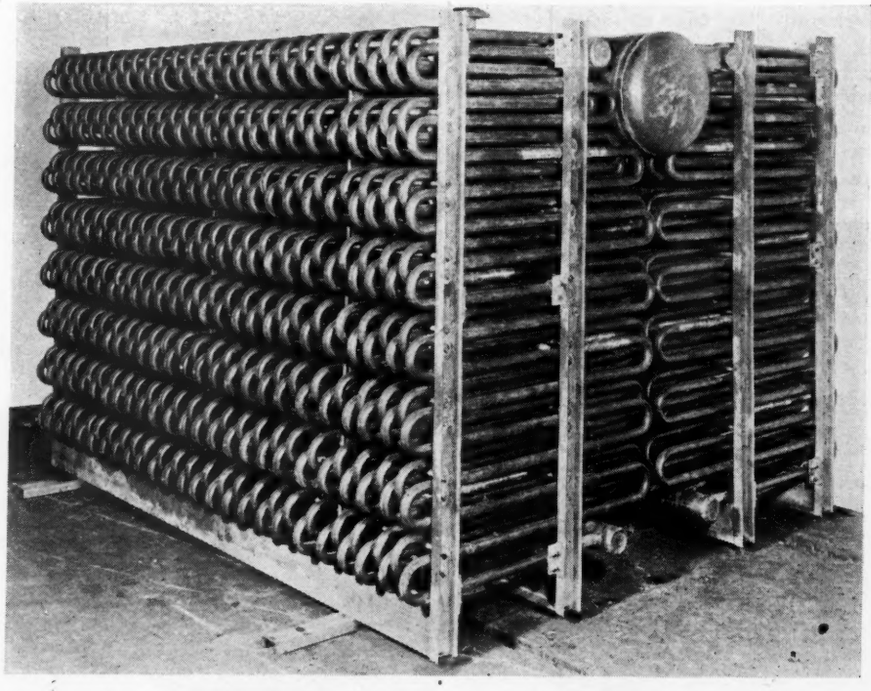
The maker states that the outstanding advantage of the fermentation method lies in the fact that complete tests can be made in three hours by persons who need not have technical knowledge. It is only necessary to prepare a fine suspension or solution of the sample in water, add the necessary reagents and place the sample in the Fermentometer. After a specified time, the volume of gas generated within the gasometer assemblies is read and the thiamine content computed.

Electrical Industrial Truck

CRESCENT TRUCK Co., Lebanon, Pa., has brought out Model K-39, an electrical industrial truck featuring demountable pneumatic tires. This truck is of the high platform utility type and has a capacity of $\frac{1}{2}$ ton. Another fea-



Electric industrial truck featuring pneumatic tires and quiet operation.



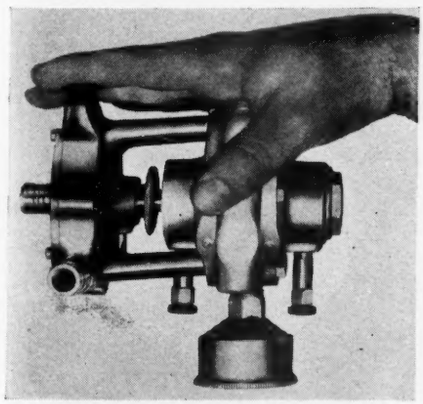
Unusual coil saves space in air blast cooling.

Sealer for sealing boxes with "Scotch Tape".

ture of the truck is the special motor and drive equipment making it practically noiseless in operation.

Box Sealer

A MOTORIZED box sealer for applying "Scotch Tape" in the sealing of boxes has been developed by Minnesota Mining & Mfg. Co., St. Paul, Minn. This sealer automatically cuts and applies a uniform length of "Scotch Tape" as the boxes are passed over two rollers. It was developed particularly for use in sealing telescope type boxes. In a recent test, the maker claims that this sealer speeded up operations from 18 boxes per minute for two girls to 25 boxes for one girl, including packing on a hand truck. When a dual set of sealers was used, output was further increased to 45 boxes per minute for 1 girl.



New midget size pumps for laboratory or experimental purposes.

Cooler Tubes

CLEANABLE TUBES for which high efficiency heat transfer surfaces are claimed are now being used in shell and tube water coolers made by Carrier Corp., Syracuse, N. Y. These tubes were originally developed for the coolers and condensers of Carrier centrifugal refrigeration machines. They are used in the Type 10 T coolers.

Small Size Pumps

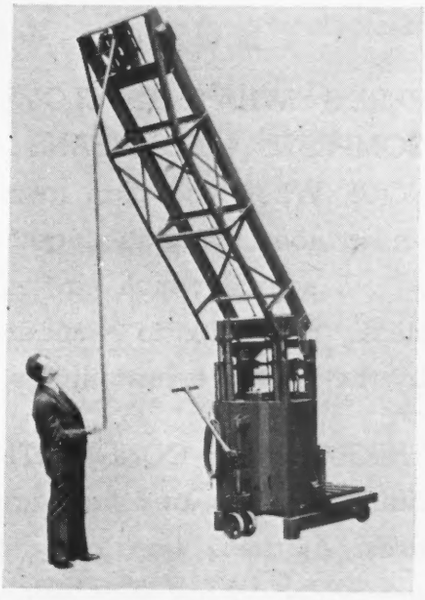
FOR USE in laboratories, pilot plants and for experimentation, Eastern Engineering Co., 45 Fox St., New Haven, Conn., has brought out a new model in its line of midget size pumps. Known as Model D, this is an air-powered pump weighing 10 lb. and equipped with a ¼ hp. air motor. The pump is equipped for connection with standard ¼ in. pipe fittings.

Washroom Deodorant

OAKITE PRODUCTS, INC., 26 Thames St., New York City, has brought out Oakite deodorant No. 1, a material combining deodorizing, detergent and disinfecting properties for use in the sanitary maintenance of washrooms, shower stalls, locker rooms, first aid rooms and similar factory facilities. This new material is said to be odorless in itself and to dissipate and neutralize odors without masking or covering up one odor with another. It is also said to provide effective dirt removal on cement, tile and porcelain surfaces, in addition to its disinfecting properties. It is a dry, white, free-flowing powder used in cold water in the proportions of one-half to 1 oz. per gallon of water.

Portable Elevator Improvement

LEWIS-SHEPARD SALES CORP., 245 Walnut St., Watertown, Mass., have developed a spring-balanced device to take the danger out of raising or lowering the hinged section of a portable elevator. As shown in the accompanying photograph, it is said one man can balance the weight of this hinged section on the fingers of one hand. This balance is accomplished by means of powerful compression springs set within cylinders, which balance the weight of the hinged upper section of the elevator.



Hinged section of elevator is balanced by heavy springs.

Dual Water Pump Drive

PEERLESS PUMP CO., 301 W. Ave. 26, Los Angeles, Calif., is now supplying a dual drive for deep-well turbine pumps in order to assure uninterrupted water supply. The pumps are normally equipped with an electric motor head. The secondary drive may be a right-angle

...so has TRI-CLOVER!

TRI-CLOVER offers the only COMPLETE LINE of Stainless Steel, Trialloy and Nickel-plated Bronze Sanitary Fittings and Pumps. A wide selection is kept in stock.

HERE'S WHAT TRI-CLOVER'S COMPLETE LINE MEANS TO YOU! When you plan to modernize your installation get everything from one source . . . a source which carries the most complete line in stock. This helps to eliminate the costly delays incurred by the lack of a few fittings.

TRI-CLOVER IS CONSTANTLY INCREASING ITS LINE of fittings, pumps, and light gauge tubing to fit specialized uses. As these items are developed and perfected, they are added to the wide selection already available.

TRI-CLOVER MACHINE COMPANY
KENOSHA, WISCONSIN

Write for the name of your nearest jobber

Try TRI-CLOVER
"THE *Complete* LINE"

Pioneer Manufacturers of Stainless Steel Fittings and Pumps

gear powered by a gas-engine, oil engine or steam turbine. In the event of interruption of the electric service, the standby power unit can be started either by an operator or by automatic control to prevent stopping of the water supply.

In addition to the type of dual drive mentioned, these units may be supplied with steam turbines as primary power and with gas engines for the secondary power source.

Duplex Rotary Pump

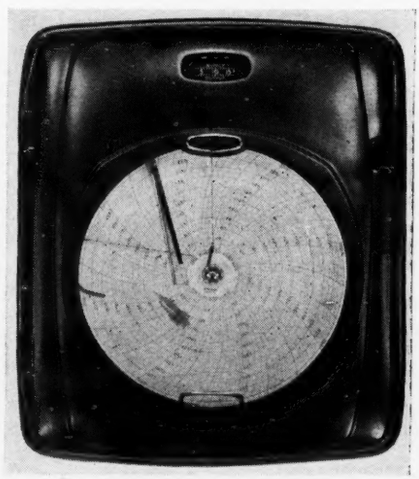
BLACKMER PUMP CO., Grand Rapids, Mich., has announced a 50-gal. Duplex pumping unit for viscous liquids and semi-solids, and for use where two different liquids are to be handled by the same pumping unit, or where temporary higher capacity is required.

This pumping unit is of standard Blackmer "bucket" design (swinging vanes) with a newly developed streamlined inlet chamber which permits the handling of liquids of high viscosity without any lowering of volumetric efficiency. Built-in relief valves (optional equipment) will handle the full capacity of the pumps without shock or end-thrust on working parts.

The unit is of two 50 gal. pumps—100 gal. per minute total capacity, pressure up to 100 lb. with lubricating liquids or 75 lb. with non-lubricating liquids. These are standard specifications, but other capacities and pressures can be supplied.

Controller With Automatic Reset

FOXBORO CO., Foxboro, Mass., has brought out the Model 30 "Stabilog" controller, an instrument embodying the features of full proportional control with automatic reset of the control point, as developed in the original "Stabilog" comptrollers, but having

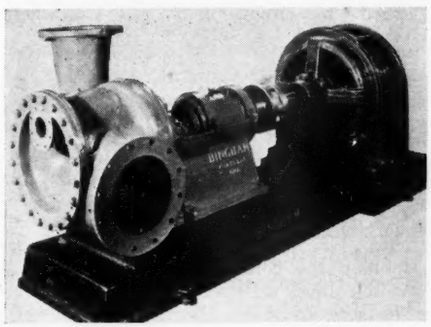


New design of automatic reset controller.

refinements for closer control and better appearance. This Model 30 has the new universal rectangular case. When panel-mounted, it extends but ¾ in. out from the panel surface. Door is recessed; hinges and hasp are flush. A dual pressure indicator, replacing the customary two small gages, is easily seen through a rectangular opening in the door.

Foam-Liquid Pump

FOR PUMPING LIQUIDS containing entrained gas or foam, such as foamy milk, Bingham Pump Co., 420 Lexington



Foam-liquid pump removes entrained gas or foam from liquid being pumped.

Ave., New York, and Portland, Ore., has developed the "Foam-Liquid" pump. This pump, of the centrifugal type, is designed to receive liquids containing foam or entrained gas, separate out the gas or foam, which is discharged through a special exhaust vent, and deliver the liquid through the pump discharge at a continuous rate. The design prevents the accumulation of foam or gas in the volute or impeller eye, thus avoiding air-binding or reduction of pump capacity.

This pump is available in various sizes and various materials to meet the needs of different installations.

Can Filling Machine Control

FOR AUTOMATICALLY CONTROLLING the temperature of the "tippers" used on automatic can filling machines for applying the solder seal, Brown Instrument Co., Wayne and Roberts Ave., Philadelphia, Pa., has developed the Tipper Temperature Control System. This is a pyrometer controller made up of an indicating millivoltmeter controller, a thermocouple and a solenoid valve.

The solenoid valve, operated by the pyrometer controller, controls the gas flame that heats the tipper. Around the solenoid valve is a bypass with minimum adjusted gas valve. The minimum adjustment is manually set by the valve in the bypass line so that the tipper does not overheat when the machine is shut down, yet does not become too cool when the solenoid valve is closed. In operation, the gas passed by the solenoid valve plus that through the minimum bypass provides enough heat for maximum operation.

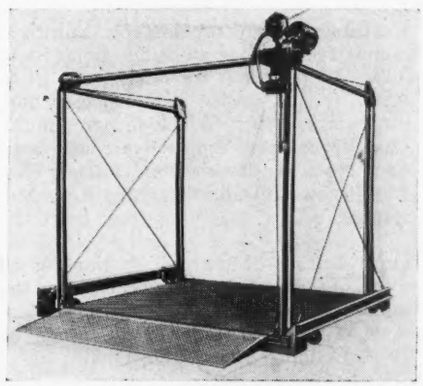
This controller is said to save solder; increase machine output by providing good, uniform seals on all cans, eliminate rejects, save operator's time, and lengthen life of machinery because operation is kept within safe temperature limits. It can be supplied with a potentiometer controller in place of the millivoltmeter, if desired.

Splashproof Micro Switch

MICRO SWITCH CORP., Freeport, Ill., has brought out a splashproof metal housed precision switch that can be mounted on any one of four sides for use as an interlock, limit or pushbutton switch. This switch is designed for operating where closely held operating points and movement differentials are needed and where any splashing may occur. The switch is listed by the Underwriters at 1,200 watts up to 600 volts alternating current.

Portable Lift

WALKER MANUFACTURING CO. of Wisconsin, Racine, Wis., has brought out a portable model of their electric industrial lift. This lift is mounted on casters so that it can be moved from place to place in the plant and is particularly adapted for use at loading



Portable electric factory lift.

platforms for raising loaded trucks to box-car or track level.

In general the construction of this lift is the same as those of stationary lifts built by this company. It consists of a framework mounted on casters having four posts. The platform is raised on these guide posts by means of an electric hoist mounted at the top. The capacity is three tons. The platform is 6½x8 ft., while the overall width of the hoist is 9 ft. and its overall length is 8 ft. 8 in.

"KETTLE KOOKERS"

If you are one of those potato chip manufacturers who is getting along with the old-fashioned method here's news that can mean big money to you. . . . Today's market, today's taste, today's prices all call for the superior product turned out by—

FERRY
CONTINUOUS POTATO-CHIP MACHINE

These completely automatic machines don't make "mistakes". Every chip is uniformly dry, crisp and salted to perfection, because each operation, slicing, washing, frying, drying and salting—is under push-button control. And one man can produce up to 350 lbs. of perfect chips an hour at far less cost than by other methods. If you are out to improve the quality of your chips and the size of your business now is the time to write for complete data on these high-profit machines . . . made in capacities from 50 to 350 lbs. per hour. Write for catalog F. I. today.

ALSO MAKERS OF:
JULIENNE MACHINES
CAN WASHERS
AND
ALL TYPES OF SPECIAL FOOD CONVEYORS

J. D. FERRY CO.
129 SO. CAMERON ST.
HARRISBURG, PA.

JUST OFF THE PRESS

BOOKLETS • LITERATURE • BULLETINS

FOOD PLANT EQUIPMENT

Deaerators—Equipment for the deaeration of both process and boiler-feed waters, including tray-type deaerators, atomizing deaerators, deaerating hot water generators, and cold water deaerators, are described and illustrated with photographs, in a 36-page catalog, having an appendix on corrosion control and pH control, issued as Publication 3005, by Cochrane Corp., 17th and Allegheny Ave., Philadelphia, Pa.

Dust Collectors—Unit type dust collectors for industrial application are described and illustrated with specifications in Bulletin 907, Pangborn Corp., Hagerstown, Md.

Grinding Mills—Ball and pebble mills, lined and unlined, jacketed and unjacketed, are pictured and described in 4-page Bulletin No. 201, H. K. Porter Co., Inc., Pittsburgh, Pa.

Lift Trucks—A 26-page catalog giving specifications of seven models of gasoline-powered lift trucks in capacities from 2,000 lb. to 10,000 lb., and general information on the use of these trucks in industrial handling, has been issued under the title of "Facts About Towmotor" by Towmotor Co., 126–8 E. 152nd St., Cleveland, Ohio.

Materials Handling Equipment—Rubber treaded impact troughing idlers for belt conveyors are described, illustrated and specifications given in Folder No. 1793, issued by Link-Belt Co., 307 N. Michigan Ave., Chicago.

Materials Handling Equipment—Vibratory conveyors and conveyor feeders, together with supplementary equipment used in the handling and packing of dry, free flowing material are described with specifications and illustrations in 48-page Catalog No. 416, issued by Syntron Co., Homer City, Pa.

Mixing Equipment—"Century" mixers in the so-called "Giant" model K type, in 40 and 80 qt. sizes, for planetary or beater mixing, are discussed in an illustrated bulletin of the Century Machine Co., 4434 Marburg Ave., Cincinnati, Ohio.

Processing Equipment—Crushing, grinding, screening, sifting, washing, conveying, drying and cooling equipment is briefly described and illustrated in 12-page bulletin B6177, of Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Portable Conveyors—Portable belt conveyors, portable bucket loaders, and portable scraper conveyors are described, respectively, in Catalogs No. 758, No. 759, and No. 761, with illustrations and specifications, by Jeffrey Mfg. Co., Columbus, Ohio.

Refrigeration Equipment—Evaporative condensers for use with ammonia and Freon-12 refrigerating systems are discussed with illustrations and dimensional tables in Bulletin No. 234-C, issued by Frick Co., Waynesboro, Pa.

PLANT SUPPLIES

Bearings—Oilless "Metaline" bronze bearings for all sorts of processing equipment, with specifications and installation information, are the subject of 16-page illustrated Catalog No. 5, issued by R. W. Rhoades Metaline Co., Inc., 50-17 Fifth St., Long Island City, N. Y.

Belt Repair Equipment—Type RO portable vulcanizer, for speedy repair of cuts or gouges in the rubber covers of conveyor belting, is described in Catalog Section 2159, issued by B. F. Goodrich Co., Akron, Ohio.

Centrifugal Pumps—A line of centrifugal pumps for handling capacities from 10 to 200,000 g.p.m. and for heads from 10 to 4,200 ft., of single- and double-suction, single-stage type; double-suction multistage type; open runner type; and axial flow type, is described in Catalog No. B-6059 by Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Drive Belting—"Multicord" belting for all sorts of industrial drives, including the most severe, is described with specifications in Catalog Section 2140, issued by B. F. Goodrich Co., Akron, Ohio.

Magnetic Separating Equipment—A 16-page illustrated bulletin describing magnetic pulleys and magnetic separator units has been issued by Stearns Magnetic Mfg. Co., Milwaukee, Wis.

Metal-Spraying Equipment—"How to Get Along with Less Priority Metal" is the title of a 16-page booklet describing the metal-spraying process, issued by Metallizing Engineering Co., Long Island City, N. Y.

Motors—An 8-page bulletin, B-6052-B, describing a complete line of "Lo-Maintenance" electric motors in ratings from ¾ to 75 hp., of open, inclosed and splash-proof types, a.c. and d.c., has been issued by Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Maintenance and Repair Tools—A line of "Angle Tool Attachments" for use with portable tools in maintenance and repair work, is discussed in an 8-page bulletin, issued by Invincible Tool Co, Fort Wayne, Ind.

Separators—"Ferro-Filters," magnetic separators for removing steel particles from liquid or finely divided materials are the subject of Bulletin No. 20, S. G. Frantz Co., Inc., 161 Grand St., New York.

V-Belt Drive—A 12-page illustrated bulletin, No. B-6051-B, illustrating and describing the complete line of "Texrope," V-Belt drives with accessories such as speed changers, adjustable sheaves, etc., has been issued by Allis-Chalmers Mfg. Co., Milwaukee, Wis.

CONTROL EQUIPMENT

Controls—Electric controls, including electric thermostats for temperatures from −50 to +600 deg. F. and pressure controls from ½ oz. to 100 lb. with various pressure differentials, are described and illustrated in a series of 11 data sheets, issued as a bulletin by United Electric Controls Co., 69 A Street, Boston, Mass.

Temperature Controllers—Automatic, electric-type temperature controllers for all types of fuel, for such applications as baking ovens, cereal ovens, smoke houses and dryers are described and illustrated in 8-page Bulletin 579, issued by Bristol Co., Waterbury, Conn.

MISCELLANEOUS

Electrical Catechism—A 48-page "Catechism of Electrical Machinery," explaining electricity and magnetism as used in electric generators and motors, both d.c. and a.c., and explaining electrical measurements, illustrated with diagrams and photographs, has been issued as Bulletin E 100 C by Fairbanks, Morse & Co., 600 South Michigan Ave., Chicago.

Laboratory Chemicals—A 1941 list of laboratory chemicals, giving best descriptions of each, has been published in a 110 page catalog of Merck & Co., Inc., Rahway, N. J.

FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

FOOD TECHNOLOGY

Determining Color of Wine

SPECTROMETRIC examination of wines is tedious and expensive. A simple procedure for fluorescence examination in ultraviolet light has therefore been developed. The sample is absorbed on a special nonfluorescent hard filter paper (Schleicher and Schull No. 602 or its equivalent) in the dark at 18 to 19 deg. C. and about 70 percent relative humidity. It is kept in the dark 24 hours (to protect any photosensitive coloring matter which may be present) and the strip of filter paper is then examined in daylight and in ultraviolet light. The results have been confirmed by spectrophotometric studies of the same samples. The test serves two purposes. First, it distinguishes clearly between the natural coloring matter of wines and artificial color such as caramel, safflower or permissible food colors. Second, it permits the observer to supplement visual inspection of wine samples in their natural color with a convenient fluorescent analysis.

A golden yellow Rhine wine known as Riesling showed narrow dark brown stripes in the upper part and gray-flecked blue in the lower part of the test strips in ultraviolet light. The same wine artificially colored, showed the same brown stripes but the lower areas were pale greenish yellow with caramel and vivid yellowish green with safflower as the color.

Digest from "Color Examination of Wines by Capillary Luminescence Analysis," by E. A. Kocsis, P. Csokan and R. Horvai, *Zeitschrift fur Untersuchung der Lebensmittel*, Vol. 81, 316, 1941 (Published in Germany).

MEATS

Palatability of Beef

TO TEST the effect on meat quality of several types of storage, right and left sides of ten beef animals each were subjected to different treatment. Nine-day storage at 34 deg. F. was compared with 37-day storage. And storage at 60 deg. F. was compared with storage at the same temperature using ultraviolet irradiation. Then the usual method of storage at 36 deg. F. was compared with storage at 60 deg. F. using ultraviolet rays.

Meat stored 37 days had a somewhat stronger aroma and flavor but was slightly less juicy than meat stored nine days. Differences in the tenderness and desirability of flavor of meat stored for the two periods were small. Meat held at 60 deg. F. for 48 hours was less desirable in appearance and odor than meat held under similar conditions but with ultraviolet irradiation. The palatability and tenderness of meat ripened by these two methods were similar, however. Meat stored at 36 deg. F. and meat held in the same length of time at 60 deg. F. with irradiation graded approximately the same in palatability, except for tenderness, which was slightly greater in meat stored at the higher temperature.

Digest from "Effect of Storage Conditions on Palatability of Beef," by Ruth M. Griswold and Marion A. Wharton, *Food Research*, Vol. 6, 517-527, Sept.-Oct. 1941.

Determining Firmness Of Fatty Tissues

AN ACCURATE, moderately rapid, readily applied and inexpensive method for determining the firmness of fatty tissue of chilled meat-animal carcasses has been accomplished by using a penetrometer. Experimentally, this instrument has been used on meats which show a marked variation in their firmness under various conditions. Pork shows a very marked degree of variation in firmness.

A study was made of back-fat samples from hog carcasses that had been chilled for 72 hours at 33 to 35 deg. F. to determine the usefulness of a penetrometer for measuring the firmness of the samples. Tentative grade limits were established in terms of penetrometer determinations for each of 5 degrees of firmness—hard, medium hard, medium soft, soft and oily. A penetrometer of standard type designed to determine firmness or consistency of foods and other materials was employed in making the tests. The penetrometer determinations are given in millimeters of penetration, using a standard working weight, a needle of specific dimensions and a standard time interval. The results increased from 18.6 for hard to 78.9 for oily samples. It is obvious that the depth of penetration for any given degree or grade of firmness depends upon the shape and size of the needle point, the weight of the working unit and the length of time during which the needle is allowed to penetrate into the sample.

For the several grades of firmness the following limits in terms of penetrometer determinations have been established tentatively: Hard, 0 to 21 inclusive; medium hard, 22 to 33; medium soft, 34 to 48; soft, 49 to 70; and oily, 71 or more.

Digest from "Use of the Penetrometer for Determining the Firmness of Fatty Tissue of Hog Carcasses," by R. L. Hiner and O. G. Hankins, *Journal of Agricultural Research*, Aug. 15, 1941, p. 233-240.

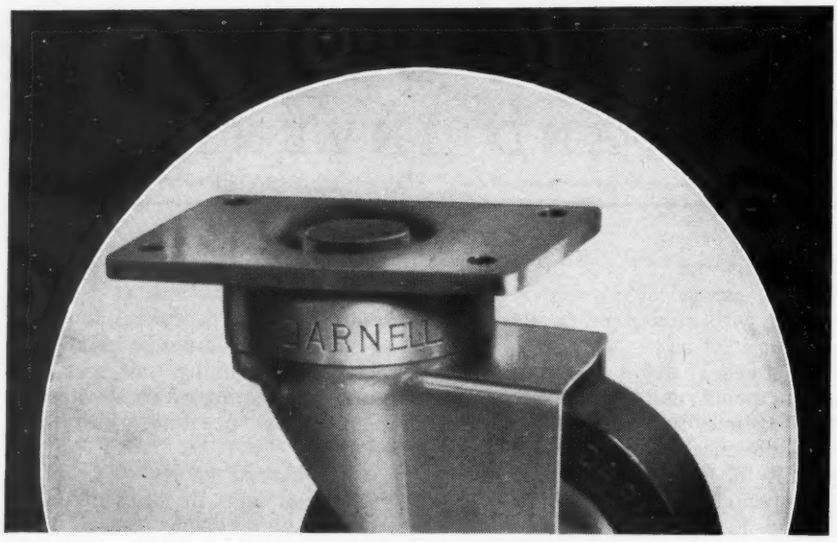
VITAMINS

Carotene from Alfalfa

ALFALFA LEAF MEAL is a valuable source of vitamins A (as beta-carotene), B, D (if sun-cured), G, E and K. It probably contains other factors also. It is rich in protein and low in fiber content. Other green plant products may have equal merit in these respects, but alfalfa meal has the advantage of being an established commercial product in large-tonnage production. An improved method has been developed for preparing a crude carotene and sterol concentrate from the leaf meal by treatment with barium hydroxide in the presence of diatomaceous earth. Soluble barium is removed from the concentrate with magnesium sulphate, and xanthophyll with petroleum naphtha. The product is an unsaponifiable concentrate containing 60,000 units of vitamin A (as beta-carotene) per gram. It apparently also contains a natural antioxidant which stabilizes the carotent against atmospheric oxidation.

By irradiating this concentrate with ultraviolet light the sterols are converted to vitamin D. The concentrate has no objectionable odor or taste and should be suitable for fortifying foods with vitamins A and D. It can be used as a source of crystalline carotene.

Digest from "Isolation of Unsaponifiable Constituents From Green Plant Tissue," by P. W. Morgal, H. G. Petering and E. J. Miller, *Industrial and Engineering Chemistry*, Vol 33, 1298, 1941.



INCREASE PRODUCTION FOR NATIONAL DEFENSE
with DARNELL DOUBLE BALL-BEARING CASTERS

Free MANUAL

NEW DARNELL MANUAL DESCRIBING NEARLY 4,000 CASTERS & WHEELS

...192 pages of helpful information. Here is a data and reference book that should be in your files... Write for your copy today!

DARNELL CORP., LTD., LONG BEACH, CALIF.
36 N. CLINTON, CHICAGO • 60 WALKER ST., NEW YORK

Ascorbic Acid Content Of Red Raspberries

VARIETAL DIFFERENCES in ascorbic acid content have been found in frozen packed red raspberries. The Antwerp variety contains 0.35 mg. per gram, the Washington variety, 0.21 mg. per gram, and other varieties, from 0.15 mg. to 0.19 mg. per gram as determined by the titration method. 2,6 dichlorophenol-indophenol was used for titrating the ascorbic acid. Determination using the Evelyn photoelectric colorimeter was in very close agreement with the titration valves.

The addition of sugar to the raspberries before freezing appeared to have some protective action on the ascorbic acid, but the data are not conclusive. Comparison of fresh and frozen pack raspberries of the same harvesting showed little difference in ascorbic acid content on the moist-weight basis, but when calculated to the dry-weight basis, the fresh berries contained more ascorbic acid.

Digest from Ascorbie Acid (Vitamin C) Content of Red Raspberries Preserved by the Frozen Pack Method," by E. Neige Todhunter and Ruth C. Robbins, *Food Research*, Vol. 6, 435-443, Sept.-Oct., 1941.

SUGAR

Gluconic Acid From Glucose

IN semicontinuous production of gluconic acid by fermenting glucose with *Aspergillus niger* the operation is improved by recovering and reusing the mycelia. This is done by pressure filtration and the recovery can be repeated over and over. There is a tendency for calcium gluconate crystals to mat with the mycelia and hinder filtration, but this can be prevented by keeping the initial calcium carbonate concentration down to 2.6 g. per 100 c.c. Recovery of mycelia was applied through nine successive fermentations in a medium containing 16 g. glucose per 100 c.c., with good results.

As compared with the flotation method which has been recommended previously, the pressure filtration method permits new fermentations with a full charge of fresh medium with higher glucose content than was formerly feasible. If free acid content is unusually low the recovery of mycelia can be effected by centrifugal filtration instead of pressure filtration.

Digest from "Gluconic Acid Production," by N. Porges, T. F. Clark and S. I. Aronovsky, *Industrial and Engineering Chemistry*, Vol. 33, 1065, 1941.

BAKING AND MILLING

Wheat Rust And Baking Quality

FOR THE miller and baker the chief damage caused to wheat by stem rust is in kernel size and plumpness, impairing milling value by losses both in yield and grade of flour. Baking strength, as judged by loaf volume and crumb texture, is not seriously affected by stem rust. Usually the baking strength of heavily infested wheat compares favorably with that of wheat from plants with little or no stem rust. The effect on crumb texture is generally greater than on loaf volume. Even badly shrunken grain may yield flour with good baking strength if protein content is high. This confirms the idea that baking strength is closely associated with protein content.

Digest from "Effect of Stem Rust on Yield, Quality, Chemical Composition and Milling and Baking Properties of Marquis Wheat," by F. J. Greaney, J. C. Woodward and A. G. O. Whiteside, *Scientific Agriculture*, Vol. 22, 40, 1941 (Published in Canada).

DAIRY PRODUCTS

Delayed Salting Of Brick Cheese

A FEW brick cheese manufacturers have attempted to hasten the ripening of brick cheese by delaying for several days the normal salting operation which usually is done in the morning of the day following manufacture. Brick cheese must be salted after it is shaped into its characteristic form. Salting is accomplished by exposing the surfaces of the loaves to sodium chloride brine or to dry salt. The flavor, body, texture and color of cheese, its rate of ripening and its composition can be affected by the method of salting, the amount of salt used and by the time of salting.

Experiments have been performed which show that delayed salting of cheese seems to have no real benefits to commend it to the practical operator. There is an apparent improvement in the body of the cheese at the end of a 14-day period during which the cheese is retained in the factory. By the time the cheese has been cured, however, this benefit has disappeared and the general quality of the resulting cheese is not as good as that of the cheese salted in the normal manner. The addition of salt soon after making probably establishes a desirable trend in flavor production and body changes in brick cheese curd that does not happen when salting is delayed.

Digest from "Observations on Delayed Salting of Brick Cheese," by W. L. Langhus and W. V. Price, *Journal of Dairy Science*, 873-880, October, 1941.

Use of Concentrated Skim Milk Foam

THE FOAMING of skim milk during various manufacturing operations has long been a source of annoyance to dairy products manufacturers. Many reports deal with prevention and destruction of foam, but apparently there have been few attempts to utilize the foaming property of skim milk. Reconstituted dry skim milks and condensed skim milks of 25 to 30 percent solids content were mechanically whipped in a few minutes to a stiff white foam. An overrun of 150 to 450 percent and a foam stability of 10 to 90 minutes were found for different milks.

Wide variations were observed in the whipping properties of skim milks. High heat treatment usually improved whipping properties. Commercial milks prepared for baking purposes generally exhibited excellent whipping ability. Skim-milk-whips were set by rennet or acid, but subsequent disturbance caused wheying-off. Fruit whips similar to an egg-white product were prepared by adding sugar to the skim milk foam and stirring fruit pulp into it.

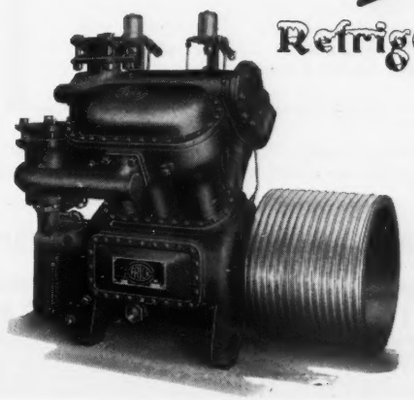
Digest from "Production and Use of Concentrated Skim Milk Foam," by B. H. Webb, *Journal of Dairy Science*, 829-834, October, 1941.

Rancidity of Homogenized Milk

A RANCID FLAVOR and an increase in acidity were found to develop readily on storage when raw milk was mixed with homogenized pasteurized milk. This observation confirms the results of earlier experiments in that lipolytic activity is not confined solely to homogenized raw milk but to homogenzied pasteurized milk as well, provided active lipase is present. The maximum increase in acidity occurred when the ratio of raw milk to homogenized pasteurized milk was approximately 1 to 1. As the percentage of raw milk in the homogenized pasteurized milk increased above 50 percent, the increase in titratable acidity was found to be correspondingly less. When only a small percentage of the sample was homogenized pasteurized milk, very small increases in acidity occurred. These increases in titratable

Smoother Running with **Eclipse**

Refrigerating Machinery



Because of automatic unloaders, capacity controls, Flexo-Seals, force-feed lubrication from submerged oil pump, safety heads, and balanced operation—among other features. Three sizes: 3, 4, and 6 cylinders. Capacities up to 60 tons. Write for Bul. 100-B.

FRICK CO.
WAYNESBORO, PENN.

Only BECKMAN pH *Equipment*
Gives You ALL The Modern Advancements!

Remember this—whether ordered for portable plant and field use or for large-scale process control work, pH equipment is something you buy once, then use for many years.

That's why it's so important—when you DO buy—that you get the most modern equipment available . . . equipment capable of handling all types of pH work *and providing all the latest developments in pH control.*

There is only ONE make of pH equipment that incorporates all the latest pH advancements . . . and that make is BECKMAN!

Only Beckman pH Equipment gives you such vitally important developments as . . .

● **HIGH pH GLASS ELECTRODES** —The only glass electrodes that permit accurate pH measurements and control in highly alkaline solutions, even in the presence of sodium ions.

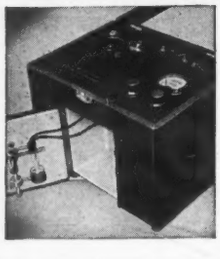
● **HIGH TEMPERATURE GLASS ELECTRODES**—the only glass electrodes that can be used for continuous pH measurements in boiling liquids.

● **MULTIPLE GLASS ELECTRODE SWITCH**—a new—*and exclusive*—Beckman development that permits as many as SIX pH control stations to be handled continuously and automatically by *one* Beckman Indicator and Recorder installation.

These are only a few of the *many* far-reaching pH advancements available in Beckman equipment *exclusively*. So when you buy pH instruments, make certain that you choose equipment capable of giving *lasting* satisfaction—capable of meeting your pH requirements *tomorrow* as well as today. *Specify BECKMAN!*

BECKMAN AUTOMATIC INDICATOR
is used extensively to control — *automatically* — large scale food processes. Operates on 115 v AC current (no batteries) . . . and incorporates all the famous Beckman developments. Can be used with ANY standard potentiometric recorder or controller to provide a permanent written record and completely automatic pH control. Ask for Bulletin 16.

BECKMAN INDUSTRIAL METER
combines unusual simplicity and ruggedness. It features a Beckman Sealed and Shielded Glass Electrode system that can be used *anywhere* with complete fredom from electrical disturbances . . . continuous pH indication over the full range 0 to 14 pH at the touch of a button. Ask for Bulletin 21.



BECKMAN LABORATORY METER
is recommended for highest accuracy and versatility in food laboratories. It features the famous Beckman Sealed Glass Electrode . . . direct temperature compensation . . . —1300 to +1300 mv scale for oxidation-reduction potentials . . . continuous (non-ballistic) indication of circuit unbalance . . . numerous special electrodes for all types of research work. Ask for Bulletin 31.

Our research staff will be glad to make recommendations on equipment to fit your particular pH problem. When writing, please give sufficient details to permit a comprehensive recommendation.

NATIONAL TECHNICAL LABORATORIES — SOUTH PASADENA, CALIFORNIA

BECKMAN pH EQUIPMENT
SAVINGS THROUGH *Scientific* PROCESS CONTROL

acidity were closely associated with the developments of a rancid flavor.

From studies that have been made, it would seem that homogenized pasteurized milk contaminated with raw milk is as susceptible to lipolysis as homogenized raw milk. These results obtained during tests indicate the possibility of controlling the extent of the development of rancidity through the use of proper mixtures of homogenized pasteurized and raw milk.

Digest from "Rancidity Studies of Mixtures of Raw and Pasteurized Homogenized Milk," by K. B. Larsen, G. M. Trout and I. A. Gould, *Journal of Dairy Science*. Vol. 24, Sept. 1941, p. 771-777.

MISCELLANEOUS

Fruit Properties Of Red Apples

THE OPINION that red apples should be picked earlier than the standard varieties for commercial use has been tested by picking red strains and the standard varieties, for comparison, at selected dates a week apart. For example, Richared and Starking were compared with Delicious, and Gallia Beauty with Rome Beauty, in lots picked weekly from September 27 to October 25. Firmness of flesh, dessert quality and cooking quality were rated by judges. Chemical tests included determination of total sugars, reducing sugars, sucrose, malic acid and total solids. Early picking of Delicious, Richared and Starking gave inferior apples, regardless of color, with a tendency to be astringent and insipid. Initial firmness of flesh was retained slightly better by apples picked in middle or late October than by the early crop. Comparison of Stayman Winesap with Staymared indicated, on the basis of flesh firmness and chemical tests, that the optimum picking date is later for the red strain than for the standard variety, instead of earlier. The differences were too small to justify any strong preference for later picking, but were definitely not in favor of earlier picking. With respect to Delicious-Richared-Starking and Rome Beauty-Gallia Beauty comparisons, the tests were equally unfavorable to early picking of red strains and standard varieties but did not indicate any later optimum date for the red strains than for the standard varieties. To develop maximum dessert quality and cooking quality the fruit should be allowed time to ripen even though it reddens early.

Digest from "Fruit Characteristics of Red Strains of Apples," by C. W. Ellenwood, *Bimonthly Bulletin, Ohio Agricultural Experiment Station*, Vol. 26, 120, 1941.

BOOKS

Air Raid Precautions

PROTECTION OF INDUSTRIAL PLANTS AND PUBLIC BUILDINGS. Published by U. S. Office of Civilian Defense, Washington, D. C. 1941. 8 pages; 8x10¼ in.; paper. Free.

Issued to assist executives in protecting their personnel and plants in event of air raid, this bulletin outlines the protective organization and the fire, police, medical and maintenance services needed. It also lists the equipment for the fire watcher station and the utility control squad.

Making Dessert Wines

COMMERCIAL PRODUCTION OF DESSERT WINES. By M. A. Joslyn and M. A. Amerine. Published by University of California, College of Agriculture, Agricultural Experiment Station, Berkeley, Calif. 1941. 186 pages; 6x9¼ in.; paper.

The authors cover all aspects of the subject, from the economic status of the California "sweet" wine industry to selected references for further reading. But of most interest to food technologists are those sections covering the principles of dessert wine making; winery design, equipment and operation; and directions for making various types of dessert wines. Then there is much tabular data of practical value to wine makers.

New Control Method

THE USE OF THE CONTACT PLATE METHOD TO DETERMINE THE MICROBIOLOGICAL CONTAMINATION ON FLAT SURFACES. Bulletin 260. By William G. Walter and G. J. Hucker. Published by New York State Agricultural Experiment Station, Geneva, N. Y. 1941. 34 pages; 5¾x8¾ in.; paper.

Complete information is given on the contact plate method, a rapid, simple and practical means of obtaining an indication of the contamination which exists on flat-surfaced utensils and equipment.

How To Handle Mackerel

STUDIES ON THE HANDLING OF FRESH MACKEREL. Published by U. S. Department of Interior Fish and Wildlife Service. 1941. 46 pages; 5⅞x9⅛ in.; paper. Price, 10 cents; for sale by Superintendent of Documents, Washington, D. C.

Every fishery which handles mackerel should study the information contained in this research report, because recommendations are made which will improve the quality of the product. It is revealed for example, that the mackerel will keep twice as long when stored in boxes of ice as when stored by the floating method. And eviscerated mackerel will keep twice as long as the whole fish.

The report also states that the fat content of mackerel varies with the season from 2 percent in the spring to 20 percent or more in the summer and fall.

Dehydration Data

PRESERVATION OF FRUITS AND VEGETABLES BY COMMERCIAL DEHYDRATION. By E. M. Chace, W. A. Noel and V. A. Pease. Published by the U. S. Department of Agriculture as Circular 619. 1941. 46 pages; 6x9¼ in.; paper. Price, 10 cents; for sale by Superintendent of Documents, Washington, D. C.

Published to supersede Bulletin 1335, this publication is packed full of practical information and data. Much is given on dehydration engineering. But there is also worthwhile information on the preparation of material, blanching and sulphuring, curing, insects, packing and storing. Of particular value is a table which lists these data on several fruits and vegetables: Method of removing the inedible portions, yield of fresh prepared product from fresh unprepared product, form for drying, approximate tray load per square foot, treatment, time, maximum and average drying temperatures, preferred moisture content, characteristics, keeping qualities and yield.

Sugar Statistics

MANUAL OF SUGAR COMPANIES, 1941, Nineteenth Edition. Edited and Published by Farr & Co., 90 Wall St., New York, N. Y. 204 pages; 8x5⅛ in.; paper. Price $1.00.

Important statistics of sugar companies and the sugar industry, with general information of reference value, are contained in this manual. The publishers have continued features of previous editions, with revisions in both the full page descriptions and synopses of miscellaneous sugar companies.

Included in the edition are the new sugar quotas, an outline of the Sugar Act and its amendment (1940) and a resumé of the sugar industry in the United States, Puerto Rico, Dominican Republic, Philippines, Hawaii and the British West Indies. A tremendous amount of data on the whole industry are found in the statistical tables, which have been extended to cover the past 25 or 30 years for comparison with conditions during the first World War.

Marketing Peanuts

MARKETING PEANUTS AND PEANUT PRODUCTS. Miscellaneous Publication No. 416. By Harold J. Clay. Published by U. S. Department of Agriculture, Washington, D. C. 1941. 124 pages; 9⅛x5⅞ in.; paper. Price, 20 cents.

A thorough analysis of the peanut industry, from harvesting and curing to transportation and marketing, is here presented with charts, tables and statistics. Acreage tables, supply and demand, geographical distribution, imports and exports, and market news reports are given complete coverage in the government study.

This is a report of a rapidly growing industry, with such products as peanut butter, peanut oil, peanut flour and peanut candy raising the harvesting quota to more than 1,000,000,000 lb. of peanuts yearly.

Sulphuring Fruit

(*Continued from page 61*)

be run in first and brought to a boil). Steam is turned on gently as soon as the open steam discharge (or jacket or coil) is covered and the balance of the fruit is added as quickly as possible. The steam is then turned on full and the batch is boiled vigorously for from 3 to 5 minutes in order to sterilize it.

With certain soft fruits, such as raspberries, no further cooking is necessary. But, generally speaking, additional boiling is required to make the fruit sufficiently soft and fluid. No hard portions should remain and the heat should penetrate thoroughly to all portions of the fruit. With plums and similar fruits, stones and pits should be reasonably free from adhering fruit structure. The fruit should not be cooked to a mush, but should be kept as whole as possible. In the case of large fruit, some breaking up is necessary, but as distinct pieces as possible are desirable. The general texture of the product should be that of "stewed" fruit.

Of course, if the fruit is too firm, the user can render it softer. But, if it is too soft, there are no means of rendering it more firm. However, it is essential that the fruit be softened sufficiently to permit penetration by the sulphur dioxide solution, and also to permit easy passage through the discharge valve and through the bung of the barrel. The additional cooking required to reach this condition usually takes from 5 to 20 minutes, depending on the degree of firmness of the raw fruit and the

efficiency of the equipment. With soft fruit, it may be necessary to stir with a paddle to obtain uniform cooking.

Standardizing the Product

When cooking is completed, the batch should be discharged to a mixing tank or receiver, where it is standardized with water to the calculated volume, if a definite "fruit strength" is specified. About 10 percent dilution usually occurs owing to condensation where "live" steam is injected into the fruit. Or, if a jacket or closed heating coil is used, the loss by evaporation from the 15 percent added water usually results in about the same final dilution. With some fruits, additional dilution may be necessary if the pulp proves too thick to flow and to allow thorough mixing of the sulphur dioxide solution.

Adding the Solution

The pulp is then run into barrels, with as little delay as possible so as to avoid cooling. The barrels are filled to within 2 or 3 in. of the bung hole, by means of a funnel. The consistency should be such that the pulp will not run out of the receiver entirely by gravity, but must be assisted by a flat paddle, "squeegee" or equivalent.

The cooperage used for this product should be new oak or fir barrels of 50 U. S. gallons capacity. *Waxed barrels must not be used* for this product.

Before filling, 5 lb. of the sulphur dioxide solution is placed in each barrel. After filling, 5 lb. more of the solution is placed in each barrel. The batch should be stirred constantly while filling, to avoid floating of the fruit and to assure uniformity between barrels. After the final sulphur dioxide solution addition is made, the barrels are closed. They are then rocked and next rolled over a number of times, to mix the sulphur dioxide solution thoroughly through the pulp. Poor mixing may result in spoilage.

Samples of each batch should be taken in sealed glass jars, stored in a warm place and examined frequently. These samples should be taken from the barrels the day following their filling and will serve as a check on the efficiency of the preservation process. If the pulp has been properly prepared, the color will bleach and there will be no fermentation.

In carrying out this method of fruit preservation, it should be remembered that sulphur dioxide is volatile and has an irritating effect on the membranes of the nose and throat, although it should be harmless in any concentrations normally met with. The solution had best be made up in a separate room or out of doors. Also, the barreling is best carried out in a separate department.

PATENTS

Beef Carcasses Dressed by Applying Brine-moistened Cloth to Freshly Skinned Surface, Applying Second Cloth Over and in Intimate Contact With First Cloth to Absorb Blood and Moisture Through First Cloth, Cooling Shrouded Carcass to Remove Animal Heat, Removing Second Cloth and Protecting the Single-cloth-covered Carcass Against Evaporation—Beverly E. Williams and Leon L. Cadwell, to Swift & Co., Chicago, Ill. No. 2,259,868. Oct. 21, 1941.

Dough Product Dried While Passing Back and Forth Longitudinally Through Chamber on Conveyor—Carmine Surico, New York, N. Y. No. 2,259,963. Oct. 21, 1941.

Glyceride Oils Decolorized by Treatment With Small Quantity of Hypophosphorous Acid or One of Its Salts at Bleaching Temperature Under Vacuum—Carl N. Andersen, Wellesley Hills, Mass., to Lever Bros. Co. No. 2,259,968. Oct. 21, 1941.

Eggs in Shell Dry Cleaned by Mechanical Application of Abrasive—Harold B. Fink, Woodlake, Calif. No. 2,260,016. Oct. 21, 1941.

Chewing Gum Base Made to Contain Polyhydroxy Alcohol Ester of Hydrogenated Rosin—Louis William Mahle, to Frank H. Fleer Corp., Philadelphia, Pa. No. 2,260,148. Oct. 21, 1941.

Solvent Extracted Soya Meal Tempered to Moisture Content Between 15 and 30 Percent and Then Heat-treated Above 212 Deg. F. With Continuous Agitation to Make High-protein Food Product—Norman F. Kruse, Decatur, and Weldon L. Soldner, Berne, Ind., to Central Soya Co., Inc., Fort Wayne, Ind. No. 2,260,254. Oct. 21, 1941.

Frozen Confection in Molds Supplied With Flavoring Materials at Desired Location by Removable-core Forms Into Which Flavoring Materials Are Poured Prior to Solidification—Richard J. Cowling, Teaneck, N. J., to Joe Lowe Corp., New York, N. Y. No. 2,260,298. Oct. 28, 1941.

Liquid Food Product Packaged in Relatively Thin Collapsible Rectangular Containers Mechanically Held in Predetermined Shape During Filling, Deaerating and Quick Freezing Operations—Joseph E. Guinane, White Plains, N. Y., to General Foods Corp., New York, N. Y. No. 2,260,450. Oct. 28, 1941.

Soya Meal Protein Concentrated by Treating Oil-free Meal With SO_2 Gas, Washing With Acid Solution to Remove Color and Other Non-protein Substances and Dissolving Protein in Protein Solvent—Francis G. Rawling and Wright M. Welton, Piedmont, W. Va., to West Virginia Pulp & Paper Co., New York, N. Y. No. 2,260,640. Oct. 28, 1941.

Animal and Vegetable Oils Containing Free Fatty Acids Treated in Closed System With Solvent Miscible With Free Fatty Acids but Substantially Immiscible With Oil, Centrifuging to Separate Oil Phase From Solvent-Fatty Acid Phase, and Vaporizing Solvent for Reuse—Benjamin H. Thurman, Bronxville, N. Y., to Refining, Inc., Reno, Nev. No. 2,260,730. Oct. 28, 1941.

Animal and Vegetable Oils Refined by Extraction With Solvents, Continuously Mixing With Refining Reagent in Presence of Solvent, Continuously Centrifuging to Separate Foots and Recovering Solvent From Oil for Reuse in Extraction Steps in a Closed System—Benjamin H. Thurman, Bronxville, N. Y., to Refining, Inc., Reno, Nev. No. 2,260,731. Oct. 28, 1941.

Butter in Slab Form Divided Into Units of Desired Size and Shape by Mechanical Means in Continuous Manner—Kenneth G. Heft, Grettie L. Heft and Earl J. Rapp, to Morris Packaging Equipment Co., Toledo, Ohio. No. 2,260,747. Oct. 28, 1941.

Poultry Plucked by Mechanical Means—John W. Kittredge to Mechanical Plucker Corp., New York, N. Y. No. 2,260,855. Oct. 28, 1941.

Oleoresinous Extract of Red Pepper Neutralized to pH of 7.0 to 8.5, Mixed With Excess of Finely Divided Edible Absorptive Agent and Heated at Less Than 160 Deg. F. to Drive Off Solvent and Produce Stable, Dry, Finely Divided Seasoning—Carroll L. Griffith and Lloyd A. Hall, to the Griffith Laboratories, Inc., Chicago, Ill. No. 2,260,897. Oct. 28, 1941.

Turnover Rolls and the Like Requiring Folding of Pieces of Dough Made by Mechanical Means—John B. Winfree, Jr., Lynchburg, Va. No. 2,261,043. Oct. 28, 1941.

Emergency Bread Ration Made From Powdered, Dried Whole-wheat Bread, Flour and Water Made Up Into Biscuit Form and Finally Dried in Oven at 120 to 130 Deg. F.—Benjamin H. Adams, United States Navy. No. 2,261,129. Nov. 4, 1941.

Fruits Split and Spread by Mechanical Means—Mark Ewald, Olympia, Wash., to Special Equipment Co., Portland, Ore. No. 2,261,150. Nov. 4, 1941.

Eggs Mechanically Sorted by Weight—Stanley N. Smith, Hollis, N. H. No. 2,261,303. Nov. 4, 1941.

Doughnuts Formed by Small-capacity, Manually Operated, Mechanical Unit—Samuel E. Witt, Geneva, Ill. No. 2,261,427. Nov. 4, 1941.

Cereals Puffed in Explosion Gun Equipped With Baffle Stirring Device in Rotating Barrel and With Means for Injecting Steam Under Pressure Into Approximate Center of Chamber—Merb R. Warren, Cedar Rapids, Iowa, to Quaker Oats Co., Chicago, Ill. No. 2,261,456. Nov. 4, 1941.

Food Packaged in Envelopes of Thin, Moisture-resistant and Nontacky Membrane Made From Unvulcanized Rubber Having Wax Covering—Emile E. Habib, Arlington, Mass., to Dewey and Almy Chemical Co., North Cambridge, Mass. No. 2,261,466. Nov. 4, 1941.

Fish Subjected to Internal Treatment of CO_2 Under Pressure to Inhibit Deterioration—Raymond V. Morris, Coronado, Calif. No. 2,261,808. Nov. 4, 1941.

Soluble, Powdered Pectin Made Dispersible in Water by Suspending Pectin Particles in Solution Containing Solvent Nonreactive With Pectin and Ions of Aluminum, Copper, Iron, Nickel or Chromium—Aksel G. Olson, Battle Creek, Mich., to General Foods Corp., New York, N. Y. No. 2,261,858. Nov. 4, 1941.

Juices of Sugar Cane or Sorghum Defecated by Treatment With Colloidal Bentonite—Ernest E. Pittman and Robert Roger Bottoms, to The Girdler Corp., Louisville, Ky. No. 2,261,917. Nov. 4, 1941.

Volatile Fermentation Products Recovered From Fermented Liquors by Treatment With Not More Than 2 Percent by Weight of Colloidal Bentonite—Ernest E. Pittman and Robert Roger Bottoms, to The Girdler Corp., Louisville, Ky. No. 2,261,918. Nov. 4, 1941.

Light-colored Table Sirup Made by Treating Concentrated Sugar-containing Juices With Colloidal Bentonite—Ernest E. Pittman and Robert Roger Bottoms, to the Girdler Corp., Louisville, Ky. No. 2,261,919. Nov. 4, 1941.

Sucrose Solution Treated by Suspension of Partially Spent Colloidal Bentonite as Aid in Refining Procedure—Robert A. Graff, Baton Rouge, La., and Ernest E. Pittman, Louisville, Ky., to The Girdler Corp., Louisville, Ky. No. 2,261,920. Nov. 4, 1941.

Packinghouse Waste Liquid Containing Protein Matter Treated With Liquid Bentonite as Aid in Removal of Protein Content—Ernest E. Pittman and Robert Roger Bottoms, to The Girdler Corp., Louisville, Ky. No. 2,261,924. Nov. 4, 1941.

Grapefruit Juices Chemically Treated for Production of Lactic Acid—Arthur J. Nolte and Harry W. von Loesecke, Winter Haven, Fla., to the People of the United States. No. 2,261,926. Nov. 4, 1941.

Food in Containers Pasteurized During Continuous Passage Through Four-zone Heat Applying Mechanism—George L. N. Meyer, Milwaukee, Wis. No. 2,262,030. Nov. 11, 1941.

Liquids Pumped and Metered in Parallel and Synchronized Units To Give and Maintain Desired Proportioning—George L. N. Meyer, Milwaukee, Wis. No. 2,262,031. Nov. 11, 1941.

. . . CHALLENGE ACCEPTED

The gauntlet has been hurled . . . A fighting America has accepted the challenge. We did not start this war, but it is the job of *each and every one of us* to make certain that America finishes it—*right!* Even selfishly, all we have to give is the very least we can give.

Our business is Adhesives—gums, glues, pastes for over 100 different industries and for many private uses. Adhesives are not gunpowder—nor armorplate. Yet they play their parts—both directly and indirectly—in many lines of war and defense.

Whatever may be required of us—in production facilities, factory space or man power—by our Government or by those supplying our Government—we will deliver to our utmost.

In addition, we are happy to go on record with the fact that 100% of our organization—in all our offices, laboratories and factories—are owners of United States Defense Stamps or Bonds.

To those of our customers who are not directly engaged in war or defense work . . . We know that America will win this fight. We know well that we will always need and value your patronage—as we have in the past, as we do today. We ask your patience, when and if we cannot always fill *over night* each and every one of the 9,000 adhesive formulae on file in our laboratories.

THE ARABOL MANUFACTURING CO.

PIONEERING SINCE 1885

NEW YORK • BROOKLYN • CHICAGO • SAN FRANCISCO

Seems like *everybody* "came from Missouri"

● Our first meeting with a real "show me" prospect was a lucky break for us. It taught us to sell by *action*—not words.

Most manufacturers had "set" opinions about their products, their ingredients, their formulas. No amount of talking could make them change these opinions. But when CERELOSE *went to work* in their own plants and demonstrated its value in experimental tests, they sensibly changed their minds.

Yes, it seems like every CERELOSE user "Came from Missouri". We had to *show* them. Now—if you don't believe that CERELOSE will improve the flavor, the texture, the eating quality or other desirable characteristics of your product, why not make us *prove* it? The experiment will cost you nothing. Is that a fair proposal?

CERELOSE *pure* DEXTROSE

WHAT'S *Your* SPECIALTY?

Ice Cream • Bread • Soft Drinks • Biscuits and Crackers
Candy and Confections • Meat Packing • Canned Fruit
Canned Fruit Juices • Jams, Jellies and Preserves

CORN PRODUCTS SALES CO., 17 Battery Place, New York, N. Y.

OFFICES IN ALL PRINCIPAL CITIES

FORMULAS FOR FOODS

FORMULA NO. 262

Norfolk Potted Tongue

Tongue (boiled)	24 lb.
Corned beef	36 lb.
Bacon (boiled)	12 lb.
Butter or margarine	12 lb.
Black pepper	12 oz.
Pimento	3 oz.
Cayenne	3 oz.
Salt	to taste

Boil tongue and bacon and remove bones. Pass the meat through a mincing machine. Mix well first with flavoring materials, then with binder (if used) and finally with the fat. Reduce to a smooth paste in a mincing machine, edge runner or colloid mill. Fill into containers, cap and sterilize at 240 deg. F. depending on size of container. The old way (still employed for local consumption) is to cover the paste, after filling into pots, with melted butter or margarine.

The product may be cheapened by using a suitable proportion of rice jelly in the above formula.

Formula from H. B. Cronshaw, London, England. Republication rights reserved.

FORMULA NO. 263

Chocolate Coconut Jumbles

Coconut (70 deg. F.) plastic	16 lb.
Fine granular sugar	13 lb.
Cocoa (high grade)	3 lb.
Skim milk powder	9 oz.
Salt	3 oz.
Shortening (70 deg. F.)	4 lb.
Water	9 lb.
Invert sugar	1 lb. 14 oz.
Bicarbonate of soda	6 oz.
Vanilla extract	4 oz.
Pastry flour	16 lb.
Baking powder	8 oz.

Place coconut in mixer bowl. Use beater and mix on second speed until smooth. Sift together the sugar, cocoa, milk powder and salt. Add mixture and shortening to plastic coconut. Cream for about 3 minutes on second speed or until medium light. Dissolve the invert sugar, soda, granular sugar and vanilla in the water. Add this sirup to the above and mix just enough to break up the mass. Sift together the flour and baking powder. Add to the batter in the mixer bowl. Mix in low speed for about 3 minutes, or until smooth.

Production Suggestions

It may be necessary to vary the amount of water. Use that amount which gives a dough of the correct consistency for desired results on the wire-cut machines. Scale 4 oz. per dozen. Bake at 370 to 380 deg. F. for 6 or 7 minutes.

Formula from General Foods Sales, Co., Inc.

Correction

In Formula No. 257, published in December, 1941, the melting point of coconut butter should be 86 deg. F.

FORMULA NO. 264

Fruit Puree Dilutions

Many of the fruit purees are so thick and rich they will stand some dilution without impairing the quality. A large number of sirup dilutions have been made and the following found to be quite suitable:

1 part pulp, 1 part 67 percent sirup
Cranberry and passion fruit

2 parts pulp, 1 part 67 percent sirup
Montmorency cherry, feijoa, red loganberry, Santa Rosa and Claret plum, boysenberry, strawberry and youngberry.

3 parts pulp, 1 part 67 percent sirup
Blackberry, Bing cherry, crabapple, Calimyrna fig, mango, New Boy nectarine, and Buerre Hardy pears.

4 parts pulp, 1 part 67 percent sirup
Hachiya persimmon

1 part pulp, 1 part 50 percent sirup
Apricot, Humbolt nectarine and Ranaree raspberry.

The indicated ratio of pulp to sirup is by volume, whereas the strength of sirup is percent sugar by weight.

Formula from International Association of Ice Cream Manufacturers, by D. G. Sorber.

FORMULA NO. 265

Raisin Bread

Bread flour	100 lb.
Water (variable)	60 to 64 lb.
Salt	1¼ lb.
Yeast	2½ lb.
Sugar	4 lb.
Malt extract	1 lb.
Mineral salt yeast food	4 oz.
Shortening	4 lb.
Raisins	60 lb.

Mixing Directions

Dissolve the yeast in part of the water. Dissolve the other ingredients, except shortening, in the mixer with balance of water. Add the flour and follow with the yeast solution. When partially mixed add the shortening and mix to a smooth, well-developed dough. Add raisins to dough and mix from 2 to 4 minutes longer until thoroughly incorporated. Temperature of the dough should be 80 deg. F. The approximate time required is 1 hour, 40 minutes for first rising; 40 minutes for second rising; 20 minutes for third rising; take-in, 10 minutes.

Formula from General Mills, Inc.

FORMULA NO. 266

Maple Kisses

Condensed maple sirup (2½ fold)	4 lb.
Standard granulated sugar	6 lb.
Corn sirup	6 lb.
Hard coconut butter	2 lb.

Mixing Directions

Cook all ingredients together to 255 deg. F. Pour on slab and pull. Salt and additional caramel color may be added if desired.

Formula from Quebec Maple Sugar Producers.

FORMULA NO. 267

Bran Muffin Mixture

Sugar	12 lb. 8 oz.
Salt	12 oz.
Hydrogenated shortening	3 lb.
Dried malt	4 oz.
Gum karaya	2 oz.
Milk powder	2 lb. 4 oz.
Soda	12 oz.
Baking cream	4 oz.
Bread flour	25 lb.
Bran	12 lb. 8 oz.

Mix ingredients together and put aside for use.

Formula from Parker-Broeg.

FORMULA NO. 268

Bran Muffins

Cold water	3 lb.
Molasses	1 lb. 4 oz.
Fruit (figs, raisins, dates, etc.)	1 lb.
Eggs	4 oz.
Bran muffins mixture (See Formula 267)	5 lb.

Mixing Directions

Place the molasses, fruit, eggs and cold water in the mixing bowl. Then add the bran muffin mixture. Mix thoroughly until batter is very soft and then allow to rest to tighten up slightly.

MERCK CONTRIBUTIONS IN THE VITAMIN FIELD

1934	*Ascorbic Acid Merck (U.S.P.) was made available.*
1936	*Vitamin B_1 was synthesized in the Merck Research Laboratories.*
1937	*Vitamin B_1 Merck (Thiamine Hydrochloride U.S.P.) was made available.*
1938	*Nicotinic Acid Merck (U.S.P.) was made available.*
1938	*Vitamin B_2 Merck (Riboflavin) was made available.*
1938	*Alpha-Tocopherol (Vitamin E) was identified and synthesized by Merck chemists and their collaborators in other laboratories.*
1939	*Vitamin B_6 was synthesized in the Merck Research Laboratories.*
1940	*Vitamin B_6 Hydrochloride Merck was made available.*
1940	*Alpha-Tocopherol Merck (Vitamin E) was made available.*
1940	*2-Methyl-3-Phytyl-1, 4-Naphthoquinone Merck (Vitamin K_1) was made available.*
1940	*2-Methyl-Naphthoquinone Merck (Vitamin K Active) was made available.*
1940	*Pantothenic Acid (Member of B Complex) was identified and synthesized by Merck chemists and their collaborators in other laboratories.*
1940	*Calcium Pantothenate Dextrorotatory Merck was made available.*

AS the foremost manufacturer of pure vitamins, Merck & Co. Inc. offers the food processor an established and dependable source of pure crystalline vitamins.

Backed by thorough experience, extensive resources, modern and rapidly-expanding production facilities, Merck is well qualified to serve food processors who are preparing to improve their products through the addition of these important nutrients.

The illustrated brochure, VITAMINS IN NUTRITION will be mailed on request.

MERCK

FINE CHEMICALS FOR THE PROFESSIONS AND INDUSTRY SINCE

★ 1818 ★

MERCK & CO. Inc. *Manufacturing Chemists* **RAHWAY, N. J.**

NEW YORK • PHILADELPHIA • ST. LOUIS • *In Canada:* MERCK & CO. Ltd., Montreal and Toronto

Do You Want Smooth VIBRATIONLESS Operation?

INVESTIGATE THE

BAR-NUN *Rotary* SIFTER

Smooth, vibrationless, low cost operation, are well liked features of this better Sifter. Its mechanically controlled full rotary motion assures very thorough single or multiple separations. Ruggedly built, the BAR-NUN gives years of continuous, economical service. Write for all the facts. Learn how this compact Sifter crowds such big capacity into so little floor space. No obligation.

B. F. Gump Co

Established 1872

454 South Clinton Street, Chicago, Ill.

Let an Independent Laboratory help your Technical Staff with its *VITAMIN PROBLEMS*

The effects of processing on nutritive values must be known for control of quality and for justification of advertising claims. We offer more than twenty years of experience in research and production problems dealing with vitamin retention, enrichment, and control. We will cooperate with your own technicians in *ascertaining the facts* and *offering scientific counsel.* Inquiries are held in strictest confidence.

FOOD RESEARCH LABORATORIES, INC.
48-14 THIRTY-THIRD STREET, LONG ISLAND CITY, NEW YORK

Drop into well-buttered muffin tins and put aside to bake as needed.

Weigh out approximately 1 lb. 2 oz. per dozen muffins. Bake at 450 deg. F. with plenty of top heat and low bottom heat. If a soft muffin is desired, keep muffins in pans until ready to sell. For crisp muffins dump shortly after taking from oven.

Formula from Parker-Broeg.

FORMULA NO. 268

Marshmallow For Chocolate Dipping

Granulated sugar	40 lb.
Standardized invert sugar	10 lb.
Corn sirup	50 lb.
Gelatine	3 lb.
Water	14 lb.

Mixing Directions

Dissolve the gelatine in the water until tender, then heat until fully dissolved. Add the granulated and standardized invert sugar and heat until they are dissolved. Place the batch into the beater, add the corn syrup and beat until the marshmallow is sufficiently light. Flavor and color can be added as desired. The proportion of water must be increased or decreased according to the conditions under which the goods are manufactured.

Formula from Nulomoline Co.

FORMULA NO. 269

Flake Pie Crust

Top-quality special cake flour	51 lb. 8 oz.
Hydrogenated shortening	32 lb. 4 oz.
Ice water	15 lb. 8 oz.
Salt	12 oz.

Mixing Directions

Mix the flour and shortening together to form crumbs about the size of large peas. Dissolve the salt in ice water and add to crumbs. Mix just enough to bind all together. Dough temperature should be 55 to 65 deg. F. for best results.

Formula from Brown's Hungarian Corp.

FORMULA NO. 270

Caramel Sauce

White sugar	5 lb.
Water	5 lb.
Cream	1 lb.
Butter	0.3 lb.
Flour	0.1 lb.

Mixing Directions

Brown the white sugar, add water and boil until it forms a soft ball in cold water. Stir quickly. Let come just to a boil, turn off heat and add butter.

EFF-BEE *Essentials*

THERE'S NO EXCUSE FOR FAULTY FLAVOR

IT'S easy to understand how dry spices and seasoning herbs can vary from crop to crop and season to season. But the food manufacturer can't tell his customers that. And for this reason he cannot risk anything short of dependable, year-round uniformity of flavor in the materials with which he seasons his products. This, then, is why so many best selling food products now embody F.B. "CONTROLLED" Seasoning Blends. Skillfully formulated to produce the taste effect desired within the limits of cost imposed, these Blends serve as a constant guarantee of quality and uniformity of flavor. And once approved, they can be duplicated year after year, with not a trace of faulty flavor. The reason is that all essential oils and oleoresins used in F.B. Seasoning Blends are strictly pure and under rigid control at every stage of their production. They represent the TRUE flavor of their respective natural herbs and spices, carefully blended to the manufacturer's precise needs and specifications.

The use of F.B. "Controlled" Seasoning Blends results in other advantages and economies. These benefits are fully outlined in a pamphlet entitled "A More Efficient Seasoning Technique" which we shall be glad to supply any food manufacturer upon request. Simply address Dept. F-4 for a free copy.

FRITZSCHE BROTHERS, Inc.

PORT AUTHORITY COMMERCE BLDG., 76 NINTH AVENUE, NEW YORK, N. Y.

BRANCH STOCKS
BOSTON CHICAGO LOS ANGELES ST. LOUIS TORONTO, CANADA MEXICO, D. F.
FACTORIES AT CLIFTON, N. J. AND GRASSE (A.M.), FRANCE

PFIZER

RIBOFLAVIN

Manufactured by an Improved Process. Highest quality assured through Progressive Research, Manufacturing Skill and Accurate Control.

U N I F O R M P U R I T Y

D E P E N D A B L E S U P P L Y

Manufacturing Chemists

PFIZER QUALITY

Est. 1849

CHAS. PFIZER & CO., INC.

81 Maiden Lane, New York

444 West Grand Ave., Chicago